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A Practical Guide for Local Officials and Citizens

Volume II

A Detailed Look at the Southwest Subregion

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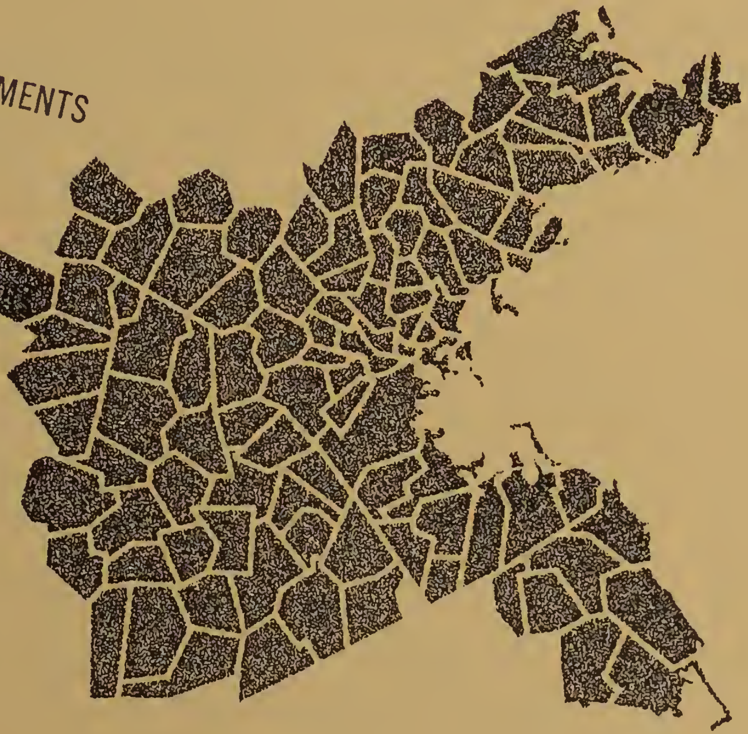

January 1986

Metropolitan Area Planning Council

110 Tremont Street Boston, Massachusetts 02108

COPING WITH THE SOLID WASTE CRISIS:
A PRACTICAL GUIDE FOR
LOCAL OFFICIALS AND CITIZENS

VOLUME II

A DETAILED LOOK AT THE SOUTHWEST SUBREGION

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Executive Summary

Finding an environmentally sound and cost-effective long-term solid waste disposal method for communities in the Metropolitan Area Planning Council's region is increasingly difficult. While nearly one-half of the communities are now relying on long-term contracts with resource recovery facilities, the remaining communities are either relying on municipal landfills for disposal or on short-term contracts with private haulers for out-of-town disposal.

Neither municipal landfills, in most instances, nor short-term contracts for out-of-town disposal are adequate disposal methods. Landfills, both municipal and commercial, are either actual or potential sources of water pollution. Further, the per-ton cost of operating state-of-the-art landfills is increasing to the point where it might soon equal or exceed the per-ton cost of disposal at a resource recovery facility. Communities relying on short-term contracts for out-of-town disposal face an uncertain future of rapidly increasing costs and decreasing numbers of contractors willing and able to haul the waste away.

Resource recovery facilities can be expensive, are time-consuming to plan and design, and are not without questions as to their efficiency and air emissions. However, resource recovery will be price-competitive with modern landfills within the next few years and studies are underway to answer questions about air emissions from these facilities.

Therefore, the Metropolitan Area Planning Council recommends that all communities which are not now using or under contract to use resource recovery facilities begin making plans to do so. During the initial stages of planning for a resource recovery facility, communities will not need to choose a vendor or technology. By the time the communities are organized to support a regional effort and are ready to select a vendor and a technology, studies on air emissions should be completed. At that time, the MAPC and communities will be able to determine whether air pollutants, such as dioxins, are present and, if they are, under what conditions they can be eliminated or controlled.

The MAPC also recommends that communities implement source reduction and recycling programs to cut costs and conserve landfill space.

This three-volume study is designed to assist local decisionmakers in choosing a long-term solid waste disposal solution for their community. Information in Volume I lists current practices throughout the region, then covers landfilling, resource recovery, volume reduction and recycling, transportation considerations, and, briefly, the state plan for solid waste disposal.

Volume II focuses on the 18 communities in the Southwest subregion. Since this subregion is the least served by existing disposal facilities, the Council has chosen to develop a step-by-step plan to aid the communities in choosing and implementing a regional disposal facility.

Volume III contains information from MAPC's solid waste data base, organized by community. Decisionmakers may find it useful to know how much waste is generated by nearby communities, which ones have successful recycling programs, how much disposal costs, and so on.

The MAPC hopes that information provided in these three volumes will help steer local decisionmakers away from continuing reliance on local landfills and short-term contracts with commercial haulers. Instead, the MAPC would like to see most, perhaps all, communities in the region relying on long-term contracts with cost-effective and environmentally sound disposal facilities.

THIS EXECUTIVE SUMMARY is included in identical form in each of the three volumes, since they may often be read separately. A broad overview of all three volumes will be useful for the reader who sees only one of the volumes.

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1. Southwest Communities and Their Disposal Practices

The MAPC chose this subregion (see Figure 2-1) as the focus of its in-depth study because the Southwest is the area least served by existing solid waste disposal facilities. The 18 towns in the subregion (see Table 2-1) are all relying on either a municipal landfill or on a short-term contract with either a commercial hauler or a commercial landfill for out-of-town disposal.

The long-term outlook for solid waste disposal in this subregion is uncertain; all but three of the municipal landfills will close before 1990 and contracts with commercial haulers for out-of-town disposal are for increasingly shorter terms (now seldom more than one year) and at rapidly escalating cost. Communities should not view disposal contracts with commercial haulers as anything other than a short-term option. The disposal crisis is imminent; considering that an optimistic estimate of the time required to plan and construct a major resource recovery facility is five years at a minimum, the 18 communities must begin planning now.

The communities in this subregion generate 138,842 tons per year or 380 tons per day. This is enough tonnage for a small resource recovery facility. The communities in the subregion many consider inviting other nearby communities without a long-term disposal method to participate in planning a facility. Additional communities would increase the tonnage available to support a cost-effective disposal solution.

The MAPC recommends that communities in this subregion begin planning now for a long-term disposal facility which will serve their needs for a minimum of 20 years. At the same time, communities may need to plan for an interim, short-term disposal method that will carry them through until a longer-term facility is ready. In order to cut their costs and decrease their waste stream thereby saving landfill space, those communities without recycling programs may wish to institute one.

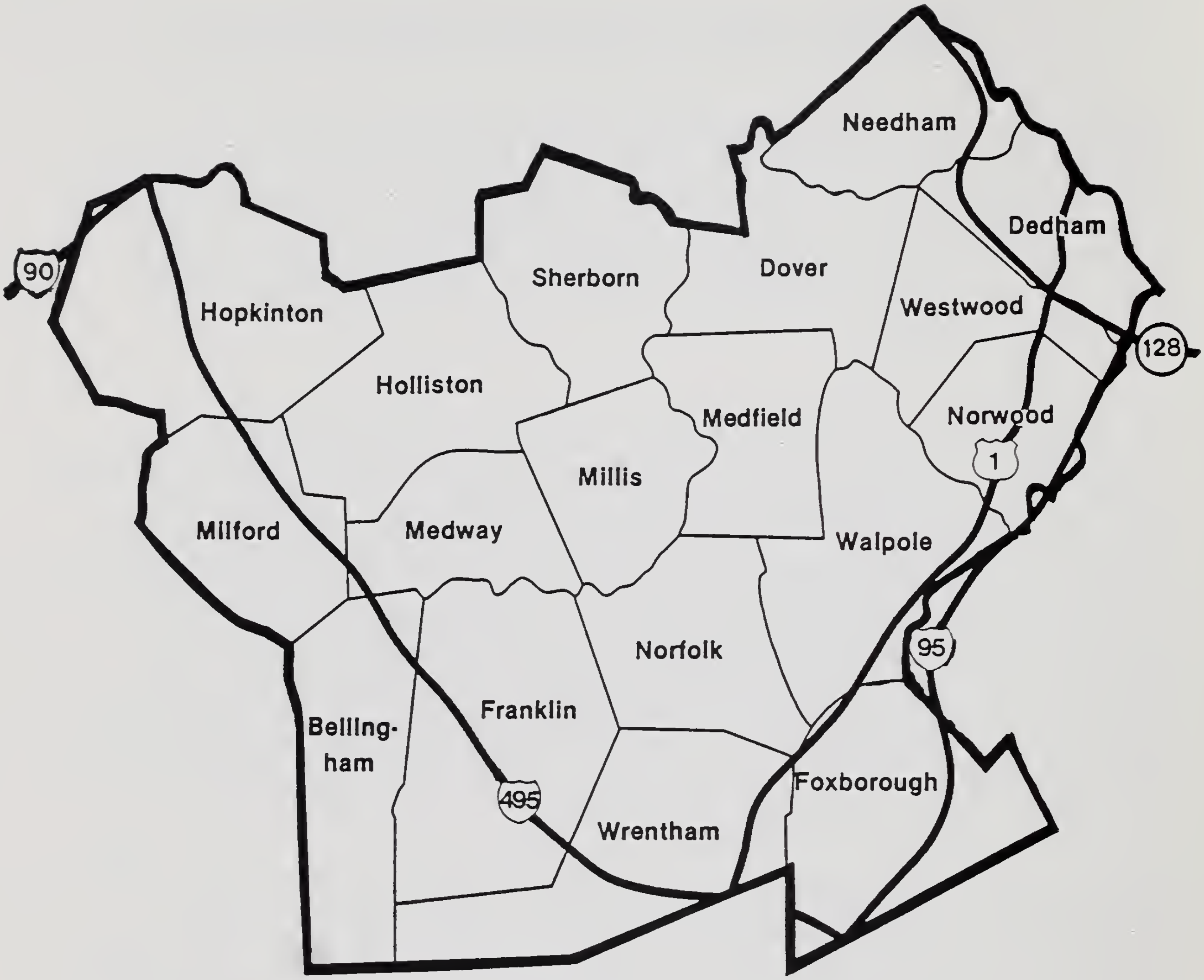


FIGURE 2-1. MAP OF THE 18 SOUTHWEST COMMUNITIES.

Table 2-1

Communities in the Southwest Subregion

	Pop.(1)	TPY(2)	Disposal(3)	Collection(4)	2000(5) Pop.	2000(6) TPY
Bellingham	14,071	10,612	MLF (88)	RC	17,500	13,125
Dedham	24,399	12,200	CLF	CC-TS	25,300	12,650
Dover	4,840	2,420	MLF (87)	RC	4,700	2,350
Foxborough	14,388	8,000	MLF (93)	CC	20,800	11,648
Franklin	19,023	9,225	CLF	RC-TS	22,500	10,800
Holliston	12,900	6,000	CLF	CC-TS	14,700	6,909
Hopkinton	7,847	3,924	CLF	CC	10,000	5,000
Medfield	10,564	5,282	MLF (87)	RC-TS	12,200	6,100
Medway	8,890	8,060	CLF	RC-TS	10,400	9,464
Milford	24,115	7,800	CLF	CC-TS	26,600	8,512
Millis	7,001	9,360	MLF (87)	RC	8,600	11,524
Needham	27,310	20,00	MLF (90)	RC	27,900	20,367
Norfolk	7,492	2,500	MLF (95)	RC	9,000	2,970
Norwood	28,918	14,459	CLF	CC	29,700	14,700
Sherborn	4,225	2,080	MLF (86)	RC	5,800	2,842
Walpole	19,293	6,000	CLF	CC	21,600	6,696
Westwood	12,976	7,800	CLF	CC	13,200	7,920
Wrentham	8,191	3,120	CLF	CC	9,900	3,762
Total	256,443	138,842			290,400	157,339

1 1984 Census Update

2 Based on information from DEM and the communities

3 MLF (88): municipal landfill (est. year of closure) CLF: commercial landfill

4 CC = curbside collection; RC = residents responsible for collection; TS = transfer station

5 2000 population figures are MAPC projections from Census data.

6 Tonnage projections for the year 2000 are based on Census estimates multiplied by the same ratio that the 1985 tonnage bears to the 1984 population.

The MAPC is not a substitute for a community's solid waste committee, nor are we a consultant with detailed technical expertise. Instead, the MAPC can serve as a liaison to assist communities in organizing themselves and working with a technical consultant.

Characteristics of the Southwest Communities

All 18 of these communities are towns; they require town meeting approval of actions authorized and funds appropriated. They range in size from small, rural towns like Dover and Sherborn, to larger, urban towns on Route 128 (e.g., Needham and Dedham). Towns on the western side of the subregion (e.g., Hopkinton, Milford, Bellingham, and Franklin) are centered on Route 495. These towns are developing more rapidly as a result of the Commonwealth's "high-tech" boom. Such rapid development puts an additional strain on public services, including solid waste disposal.

2. Selecting a Disposal Method

To assist local decisionmakers in choosing the solid waste disposal method that will best serve their needs, this section first explains why the MAPC recommends a long-term regional disposal method. Then, the section continues with information on landfills and resource recovery facilities, so that decisionmakers will know what effects their choice of disposal method will have on their communities and what they can expect as they implement their chosen method. Lastly, we have included a summary and comparison section on the disposal methods currently available to communities.

Now that many municipal landfills are reaching capacity or are closing down because they pollute or are facing prohibitive compliance improvement costs, communities are looking out-of-town for disposal facilities. The community may either contract with a private hauler for both hauling and disposal at an unspecified facility or contract directly with a commercial landfill.

Under both of these scenarios--contracting with a hauler or with a commercial landfill--only short-term contracts are available. So, after a few years, typically one to three, local officials are once again "shopping" for another disposal solution. To make matters worse, costs frequently escalate dramatically from one year to the next. There is no way to insulate communities from sudden, unanticipated soaring of their disposal budgets. Even those communities which can continue to absorb these costs will find themselves competing for dwindling landfill space.

The MAPC has examined landfilling and concluded that it cannot continue to be the primary disposal method for most communities. The region needs a dependable; long-term disposal solution with predictable cost escalation and a feasible implementation schedule.

Since so many--fifteen--of the Southwest communities will need this type of long-term facility within the decade, and since the costs of each community continuing to pursue its own solution are so high, the MAPC recommends a regional effort to solve the problem. The economies of scale inherent in a regional solution have been demonstrated both in Masschusetts and elsewhere in the country.

The following information on landfills and resource recovery facilities gives the reasons behind MAPC's recommendation of a long-tem regional resource recovery facility as the primary disposal method for the 18 Southwest communities.

2.1 Landfill Cost Analysis: Operating an Existing Landfill

Landfills continue to be the prevailing method of solid waste disposal in the Southwest subregion. Of the 18 towns, 8 use municipal landfills. The waste generation for these 8 towns is about 165 tons per day, or about 44 percent of the municipal solid waste generated in the southwest subregion. The remainder of the subregion's solid waste, about 215 tons per day, is disposed of in commercial landfills.

A community's choice of a method of solid waste disposal is dependent upon several factors, a major one being the cost of disposal. Solid waste costs fall into two major categories: the cost of transportation and the cost of ultimate disposal in a landfill, incinerator, resource recovery plant, or other method. The following sections will examine the current and projected future costs of municipal and commercial landfills. The costs of other disposal methods, as well as the costs of transportation, are presented elsewhere in this report.

2.1.1 Municipal Landfills

The cost of operating existing municipal landfills, as reported by the communities, varies widely from a low of $8 per ton to a high of $43 per ton (see Table 2-2). This variation in costs can be attributed to two major factors: (1) actual differences in cost due to the size and type of operations, and (2) differences in the method of accounting for solid waste costs. Differences in operations may include town-managed operations versus contracted operations, and whether a significant amount of commercial waste is accepted at the landfill. Accounting differences include whether such items as capital expenditures, interest, and the cost of supervisory personnel are included in the solid waste budget. These cost differences are illustrated by the following case study of the solid waste budgets of three communities in the Southwest subregion.

Landfill Cost Case Study: Medfield, Millis, and Norfolk

An examination of the solid waste budgets of three towns reveals some of the typical differences in operating costs and methods of accounting for solid waste costs. The three towns, Medfield, Millis, and Norfolk, all operate landfills under the current state regulations (310 CMR 19.00), and not under the pending regulations which incorporate more stringent groundwater protection measures (Note: the town of Norfolk is also expanding its landfill under the new regulations. The additional costs associated with this expansion are dealt with separately below.) All three towns operate municipal landfills within their borders, and the costs analyzed are associated with the operation of the landfills and not with transporting solid waste, or any unrelated activity. It should also be noted that the three towns have different-sized operations: 2500 tons per year (TPY) for Norfolk; 5164 TPY for Medfield, and 9360 TPY for Millis. Due to economies of scale which cannot be accurately quantified, larger operations tend to have lower unit costs.

Table 2-2
Summary of Municipal Landfill Costs
in the Southwest Subregion

TOWN	WASTE GENERATION	TOTAL COSTS	COST PER TON
	(tons/year)		
Bellingham	$10,612	$ 88,000	$ 8.29
Dover	2,420	102,995	43.40
Foxborough	8,000	236,000	29.50
Medfield	5,282	70,000	13.55
Millis	9,360	99,558	10.64
Needham	20,000	333,928	16.70
Norfolk	2,500	32,403	12.96
Sherborn	2,080	51,000	24.52

The solid waste budgets for the three communities are presented in Table 2-3. A side-by side comparison of these three budgets reveals some interesting differences which may explain the variation in solid waste costs. The range of costs in these towns is from $10.63 per ton to $16.95 per ton. Solid waste costs may be broken down into four categories: personnel, engineering, operations, and capital costs.

Table 2-3

Cost Comparison of Municipal Landfills

1984 COSTS	NORFOLK	MEDFIELD	MILLIS
Population	7,492	10,564	7,001
Waste Generation (TPY)	2,500	5,164	9,360
Per Capita Per Year	4433	.5	1.3
1 PERSONNEL			
DPW Supt./Clerical	-	-	13,500
Operations	11,453	21,569	2,000
Custodians	-	-	15,000
Outside Services		2,284	
TOTAL PERSONNEL	11,453	23,853	30,500
2 ENGINEERING	2,400	3,500	2,000
3 OPERATIONS			
Cover Material	6,000	22,604	-
Fuel	5,000	7,943	-
Utilities	300	2,378	-
Vehicle Repairs	-	2,500	-
Oil & Grease	500	800	-
Equipment Rental	-	2,704	-
Equipment Parts	6,000	5,400	-
Mileage	-	50	-
Misc. Supplies	750	1,225	1,000
Contractors	-	-	21,500
TOTAL OPERATIONS	-	43,104	22,500
4 CAPITAL COSTS	-	17,000	44,558
GRAND TOTAL	32,403	87,457	99,558
COST PER TON	$12.96	$16.94	$10.63

Personnel Costs. The personnel costs in the three towns appear to be related to the size of the operation. Table 2-4 shows that personnel costs per ton fall into a fairly narrow range.

Table 2-4

Municipal Landfill Personnel Costs

Town	Size of Operation (Tons/Year)	Personnel Cost	Personnel Cost per ton
Norfolk	2500	$11,453	$ 4.58
Medfield	5164	$23,853	$ 4.62
Millis	9360	$30,500	$ 3.26

However, there are differences in accounting for personnel cost which indicate that the costs for Norfolk and Medfield may be somewhat underestimated. While all three towns account for the cost of landfill custodians and/or operators, only Millis also includes the cost of supervisory and clerical staff within the solid waste budget. This item, at $13,500, accounts for nearly half of the town's personnel cost for solid waste and represents a fraction of the cost of the Public Works Superintendent's time, as well as clerical support in the DPW. Since neither Norfolk nor Medfield include any items for supervisory or clerical personnel, their actual personnel costs may be higher than indicated. If this is the case, the overall per ton disposal costs would also be higher than shown in Table 2-3. This points out that estimated disposal costs in each community are greatly influenced by the method of accounting for the various components of the solid waste budget.

Operations Costs. The second major cost component is the cost of operations, which includes materials (such as cover material, fuel, oil and grease), utilities, equipment parts and repair, and miscellaneous supplies. There are several points of difference between the three case study towns under this cost category.

A major difference in the cost of operations is the cost of cover material. If this material is available at the landfill site, this costs category will be negligible. If it is available on town-owned land away from the site, as it is in Millis, there will be a relatively small cost associated with transporting the material to the landfill. If cover material is not available on town-owned land, the town must purchase the material and pay for transporting it to the landfill, as is the case in Medfield and Norfolk. As shown in Table 2-3, cover material represents about one-half of the costs of operations in Medfield, and about one-third of operations costs in Norfolk. The availability of cover material, then, is the single most important factor affecting the costs of landfill operations. This impact on operations costs can be seen in Table 2-5, which shows that the operations costs on a per-ton basis is significantly lower in Millis, where cover material is available on town-owned land.

Table 2-5

Municipal Landfill Operations Costs

Town	Size of Operation (Tons per Year)	Cost of Operations	Cost per ton
Norfolk	2500	$18,550	$7.42
Medfield	5164	$43,104	$8.35
Millis	9360	$22,500	$2.40

Another point of difference between the towns is the method of operations. The towns of Norfolk and Medfield both run their landfill operations "in-house," using equipment in their Highway and Public Works Departments. Millis, however, has an outside contractor perform landfill operations. Rather than pay for the cost of equipment, fuel, maintenance, and so on, the town pays a single annual fee ($21,500 in 1984) to a contractor, who does the daily landfill building and maintenance using his own equipment. If operations costs without cover material are compared in the three towns on a per-ton basis, it appears that the cost of Millis' contracted operations is significantly less than the cost of in-house operations in Norfolk and Medfield (see Table 2-6; also note that Bellingham, Table 2-2, has contracted operations, and also has the least expensive solid waste costs, on a per-ton basis, in the Southwest subregion).

Table 2-6

Municipal Landfill Operations Costs, Excluding Cover Material

Town	Waste Generation (tons per year)	Cost of Operations Excluding cover Material	Cost per ton
Norfolk	2500	$12,550	$ 5.02
Medfield	5164	$20,500	$ 3.97
Millis	9360	$22,500	$ 2.40

In summary, the costs of local landfill operations are most affected by the availability of cover material and the method of operation. An additional factor which is difficult to quantify is the size of operations. Due to economies of scale, larger operations have lower unit costs. This may also contribute to the lower costs shown for Millis.

Engineering Costs. A normally small component of the municipal landfill budget is the cost of engineering services. Unless there are unusual circumstances which require additional services, engineering costs usually amount to less than ten percent of the solid waste budget. In the case study towns, the costs range from $2000 to $3500, representing from two percent to eight percent of the total costs. These fall within the normal range and do not indicate any significant difference between the three towns. On a per-ton basis, engineering costs in the three towns range from $.21 per ton to $.96 per ton.

Capital Costs. Capital costs include the initial investments made in developing a landfill and providing the necessary equipment. These may include: land acquisition, engineering and design, site preparation, utility connections, buildings, fencing, roadways, and rolling equipment. The cost of capping and closing a landfill at the end of its usable life should also be included in capital costs. Usually these capital outlays are at least partially financed by municipal bonds or other credit instruments, so the cost of interest on debt service must also be included. Since most of these costs are incurred once and the benefits accrue over the usable life of the landfill, the most appropriate way to account for these costs is to annualize them over the life of the landfill.

There are major differences in the way communities account for capital costs, and these differences are exemplified in the three case study towns (see Table 2-7). Some communities, such as Millis, fully account for all landfill development, closure, and equipment costs by including an annualized capital cost in each year's solid waste budget. Other communities, such as Medfield, include an annualized capital cost which represents some of the total capital costs. In the case of Medfield, equipment capital costs are included. Finally, many communities, including Norfolk, do not account for any capital costs in their solid waste budget. The magnitude of capital costs is such that they represent the single largest source of variation in disposal cost among communities. As shown in Table 2-7, in Millis, where they are fully accounted for, capital costs represent 45 percent of the solid waste budget. In Medfield, where they are partially accounted for, capital costs represent 20 percent of total disposal costs. In Norfolk, no capital costs are included. This has the effect of significantly underestimating the total and per-ton costs of solid waste disposal.

Table 2-7

Municipal Landfill Capital Costs

Town	Waste Generation (tons per year)	Capital Costs	Percentage of Total Costs	Cost Per Ton
Norfolk	2500	-	-	-
Medfield	5164	$17,000	20%	$3.29
Millis	9360	$44,558	45%	$4.76

It should be noted that the reason capital costs are frequently omitted or partially accounted for in solid waste budgets is related to the purpose for which these budgets are prepared. These budgets are developed each year in order to account for annual appropriations needed to cover current operating expenses, which include personnel, engineering, and operations costs. Previously incurred debt is usually accounted for separately.

Thus, capital costs are not intentionally obscured, but the budgeting process can have the effect of separating out capital costs from current expenses. For planning purposes, and for comparing the relative costs of alternative methods of disposal, it is necessary to take capital costs into account.

Cost Case Study Summary

The above sections showed how variations in accounting for personnel, operations, and capital costs can cause wide differences in the estimated costs of solid waste disposal in three communities. A breakdown of these three towns' disposal costs according to these major costs component categories is summarized in Table 2-8 and Figure 2-2.

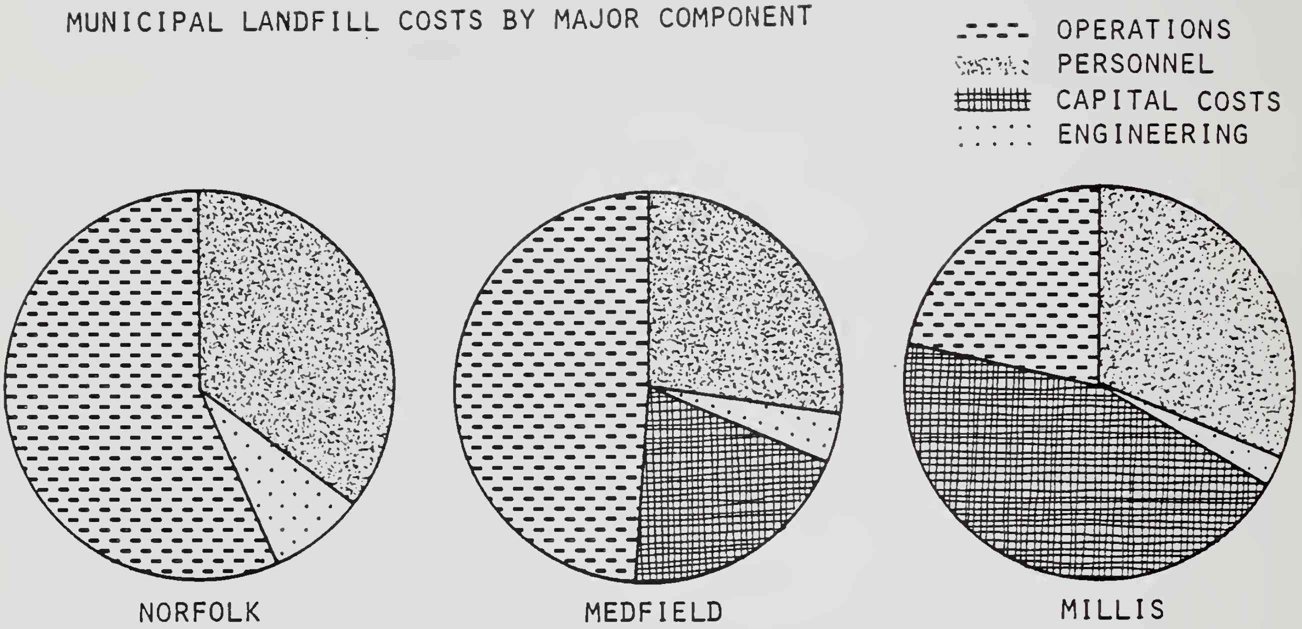
Table 2-8

Municipal Landfill Costs by Major Component

	NORFOLK	%	MEDFIELD	%	MILLIS	%
Personnel	$11,453	35	$23,853	27	$30,500	31
Operations	18,550	57	43,104	49	22,500	22
Engineering	2,400	8	3,500	4	2,000	2
Capital & debt	-	-	17,000	20	44,558	45
TOTAL	$32,403		$87,457		$99,558	

FIGURE 2-2

MUNICIPAL LANDFILL COSTS BY MAJOR COMPONENT



2.1.2 Commercial Landfills

Of the 18 Southwest communities, 10 dispose of their solid waste in commercial landfills. The municipal solid waste generated by these towns amounts to about 215 tons per day or about 56 percent of the total in the Southwest subregion. Commercial landfills tend to be much larger than municipal landfills, handling the waste of many communities, as well as commercial waste. There are presently 15 commercial landfills in eastern Massachusetts, with a combined capacity of about 5000 tons per day (see Table 2-9 and Figure 2-3). However, many of these commercial landfills are near their projected closure date, and the availability of commercial landfill capacity will be drastically reduced over the next three to five years (see Figure 2-4). According to DEQE estimated closure dates, by 1988, 12 of the 15 commercial landfills in eastern Massachusetts will reach their permitted capacity. If these landfills close, the total capacity in the region will be reduced from 5000 tpd to 1250 tpd, a loss of 75 percent of existing capacity.

The specter of such a drastically reduced landfill capacity raises the issue of cost: in a market in which demand is constant or increasing, while supply is decreasing, rapidly rising prices can be expected. In fact, the mere prospect of imminent capacity reductions, combined with more costly DEQE regulations (discussed below), seems to be exerting pressure for price increases already. In the last several months, most communities which have renewed their contracts with commercial landfills have experienced significant price increases. A sampling of seven MAPC communities found a range of cost increases of 18 percent to 156 percent over previous contract costs, with an average increase of 71 percent (see Table 2-10 and Figure 2-5). These remarkable cost increases have occurred in advance of the actual loss of any commercial landfill capacity due to landfill closure. In an increasingly volatile market, the current increases appear to be an early warning of the kinds of rapidly escalating prices which might be expected with the advent of future landfill closings.

Table 2-9

Commercial Landfills in Eastern Massachusetts

	T.P.Y. (DEM)	T.P.D. (DEQE)	LIMIT (T.P.D.) (DEQE)	CLOSURE DATE (DEQE)
1. BFI-RANDOLPH	125,000	500	500	1986
2. COHASSET HEIGHTS	78,000	250	299	1994
3. GCR-PEABODY	58,000	150-300	299	1985
4. SHAFFER-BILLERICA	312,000	700-1000	855*	1986
5. ACUSHNET	60,000	200-300	290	1988
6. ATTLEBORO	73,200	250	250	1988
7. E. BRIDGEWATER	83,000	250-300	299	1986
8. FALL RIVER	170,000	500	500	1988
9. PLAINVILLE (LAIDLAW)	182,000	750	750	1999
10. HALIFAX (McDONALD)	130,000	250	250	1996
11. HOPEDALE (FARRAR & CARTO)	10,500	40	40	1984
12 HOPKINTON/WESTBORO (HARVEY)	30,500	40	40	
13. HUDSON/STOW (MELONE)	3,000	?	8*	1988
14. HAVERHILL/RFA	200,000	?	548*	1988
15. BRIDGEWATER	7,500	?	20*	1988
TOTAL	1,523,200	-	4,951	

*Estimated actual tonnage, not a permitted limit

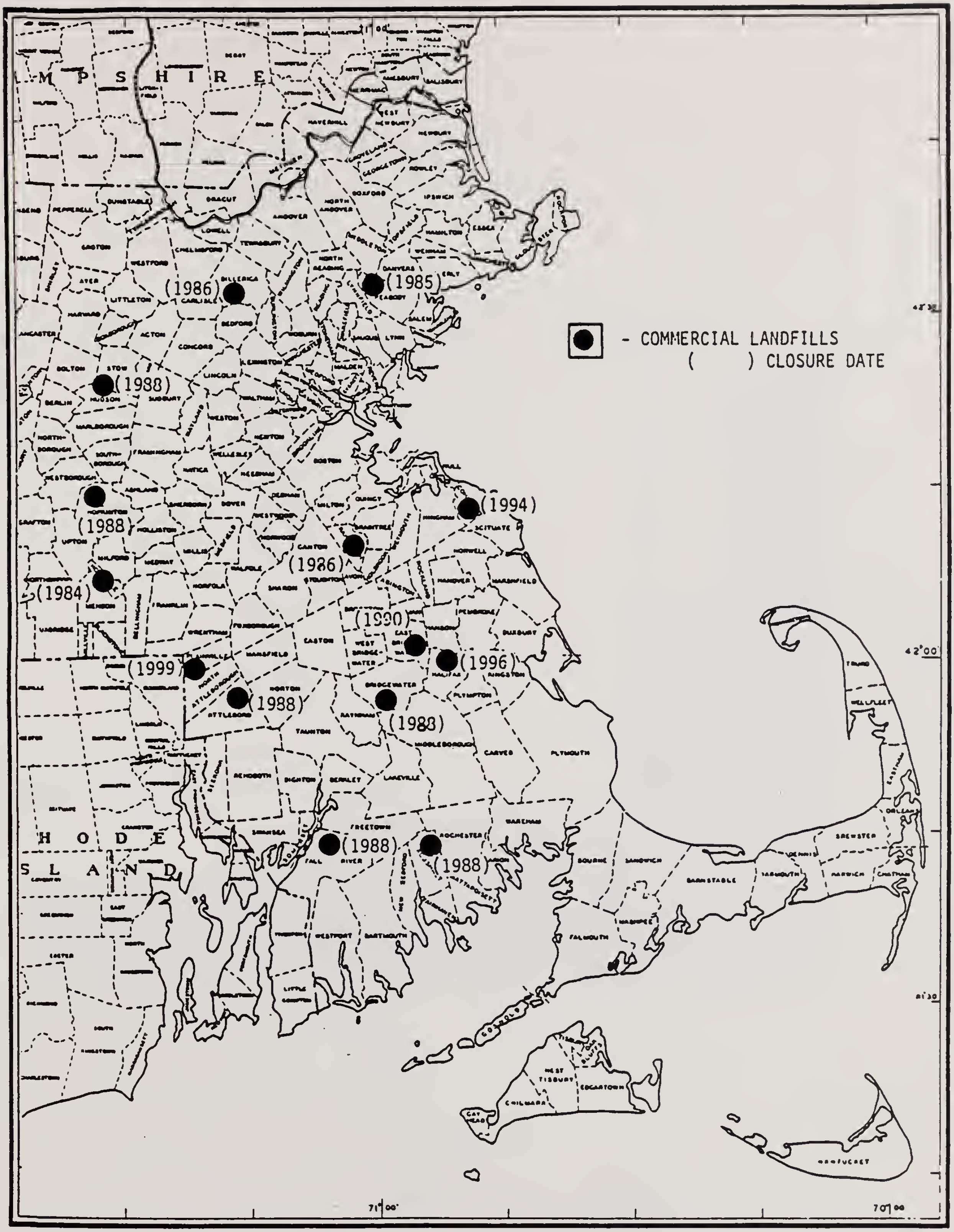


FIGURE 2-3. REGIONAL SOLID WASTE FACILITIES.

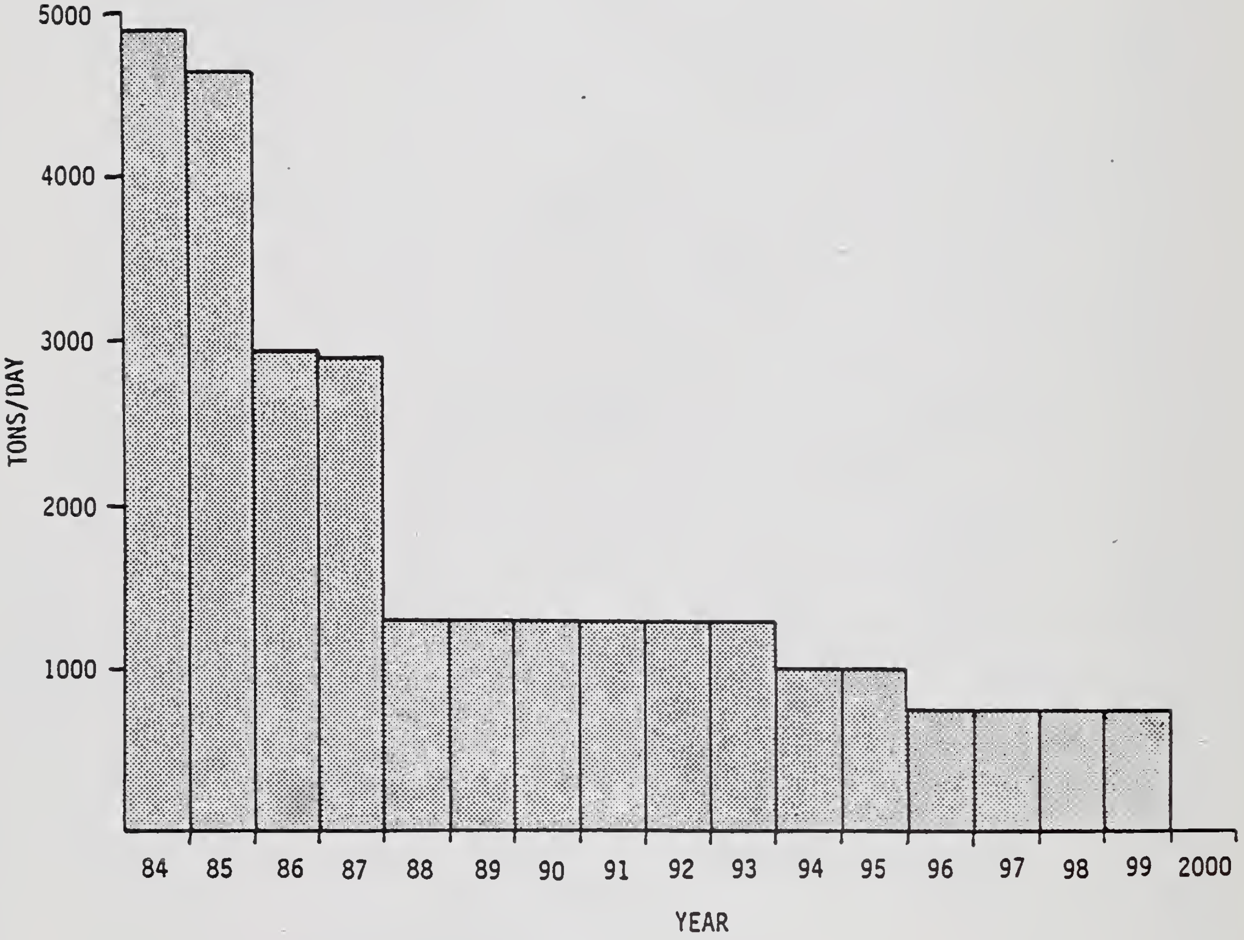


FIGURE 2-4. COMMERCIAL LANDFILL CAPACITY IN EASTERN MASSACHUSETTS.

Table 2-10

Increases in Commercial Landfill Disposal Costs

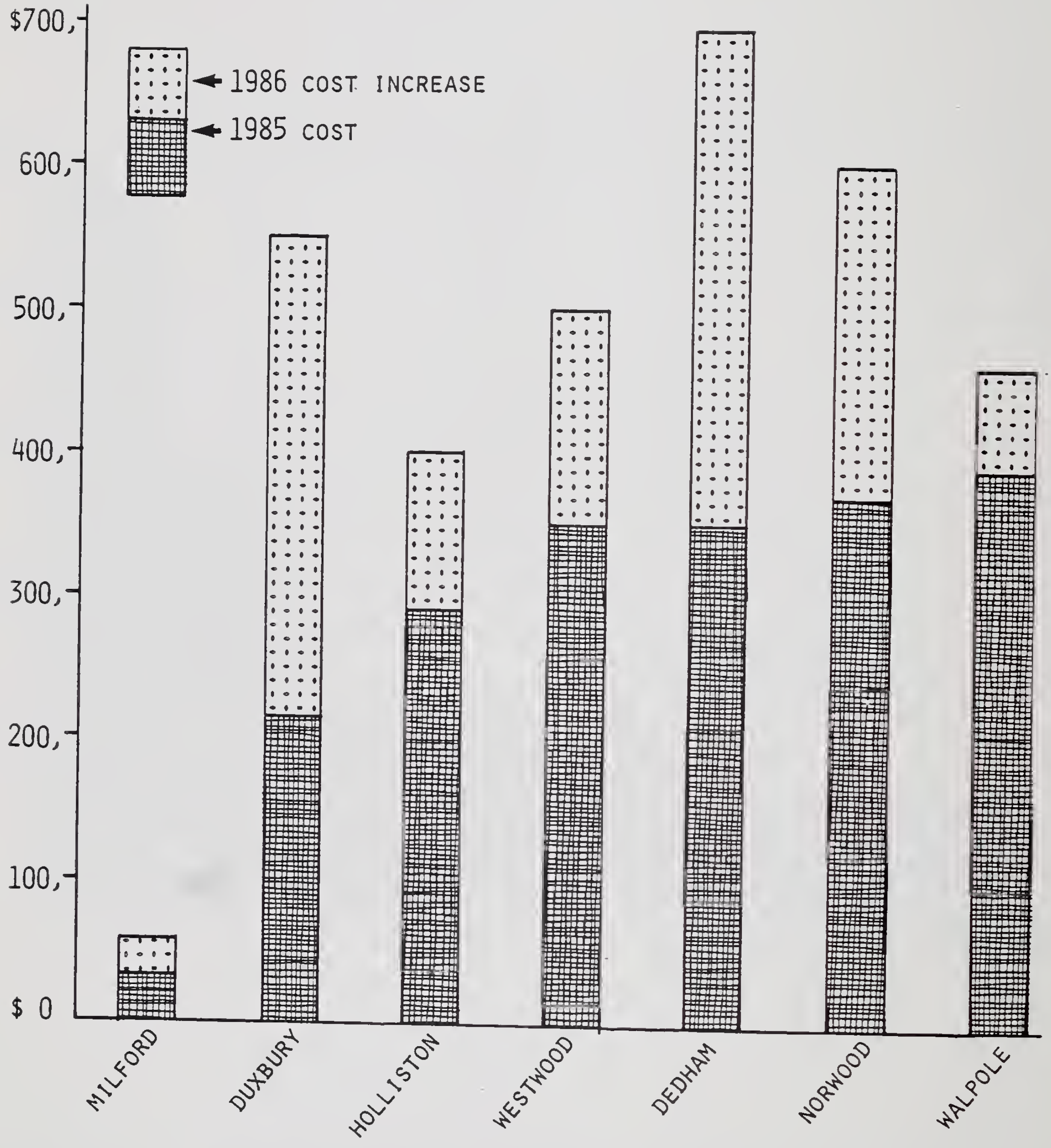
(annual contract costs for hauling & disposal)

COMMUNITY	FY1985	FY1986	PERCENT CHANGE
Dedham	$350,000	$695,000	99%
Holliston	290,000	400,000	38%
Milford	31,500	57,500	82%
Norwood	370,000	600,000	62%
Walpole	390,000	460,000	18%
Westwood	350,000	500,000	43%
Duxbury	215,000	500,000	156%
Average Increase	-	-	71%

FIGURE 2-5

COMMERCIAL LANDFILL COSTS, 1985-1986

(THOUSANDS OF DOLLARS)



Another indicator of the uncertainty in the commercial landfill market is the length and terms of contracts currently being renewed. Whereas in the past most communities enjoyed fairly long-term contracts at relatively low rates, new contracts are either being written for shorter terms or with provisions for price escalations each year. Shorter term contracts allow the commercial operators to raise prices more frequently; this trend indicates that the operators are hedging their bets about future disposal prices.

Several communities have taken steps to attempt to obtain cost savings in renewal of their commercial landfill contracts. However, to date these attempts have not proved successful. Norwood and Westwood attempted to negotiate a joint collection and disposal contract in the hope that a regional contract would bring cost savings to both communities. One of the bids received would have cost less for a two-town joint contract than two separate contracts. However, all of the savings accrued to one of the two towns, making a joint contract unattractive to the other town. As a result, the joint contract proposal was dropped, and each town negotiated a separate contract. These new contracts represented a 43 percent increase for Westwood and a 62 percent increase for Norwood.

2.2 Landfill Cost Analysis: New or Expanded Landfills

As described above, many of the landfills in the Southwest subregion and throughout the state are nearing capacity, and continued use of landfills for solid waste disposal will require construction of new or expanded landfills. In the southwest subregion, six of the eight existing municipal landfills will reach capacity by the end of 1990 (see Figure 2-6); within the next several years, many communities will face a decision to either construct new or expanded landfills or develop alternative methods of solid waste disposal. The costs of new landfills will be a major determining factor in such decisions for most towns.

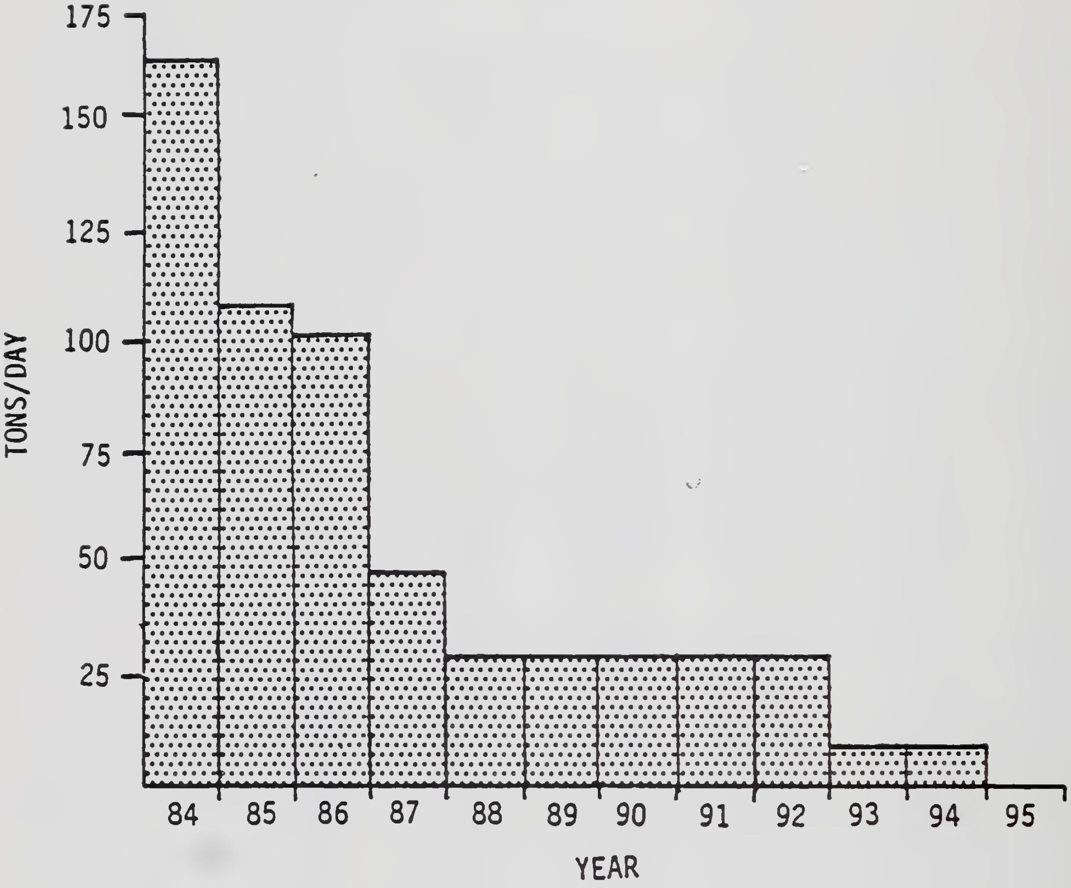


FIGURE 2-6. MUNICIPAL LANDFILL CAPACITY - SOUTHWEST SUBREGION.

In eastern Massachusetts, 12 of the 15 existing commercial landfills will reach their capacity by 1990. The cost of developing new commercial landfill capacity will also have a major impact on solid waste disposal costs in the future, and will greatly influence the choices available to communities.

This section will examine the costs associated with development of new municipal and commercial landfill capacity under the new DEQE regulatory requirements for groundwater protection measures. The costs presented here are estimates based on a general costing methodology for landfills of various sizes. Specific conditions at an actual landfill site may cause actual costs to vary from those presented here. These cost estimates are intended as a general guide and as an aid to community decision making on solid waste alternatives. The costing methodology will be followed by two cost case studies.

2.2.1 Estimating New Landfill Costs

A cost estimating methodology developed by the DEQE will be updated and applied here. The methodology breaks down landfill development into component capital and annual costs, and applies estimated unit costs to each component. Using this methodology, the costs of five representative sizes of landfills are estimated, from 10 tons per day (TPD) to 250 TPD. The methodology applies to both municipal and commercial landfills, which differ only in size. Most commercial landfills handle more than 100 tons per day, while most municipal landfills handle less than 100 tons per day (the municipal landfills in the southwest subregion range from 7 TPD to 55 TPD). Regardless of size, all new municipal or commercial landfills in Massachusetts must meet the requirements of new state regulations promulgated by DEQE for the protection of water resources. These regulations impose additional costs on new landfills through requirements for landfill liners, leachate collection and treatment, groundwater monitoring, gas monitoring and venting, and landfill capping and closure. All of these costs are taken into account in these estimates.

It should be noted that the new DEQE regulations have been contested on the grounds that they are in violation of Proposition 2-1/2 because they represent a state-mandated cost to communities. This issue is currently unresolved. However, this issue concerns who pays the costs of groundwater protection measures and does not affect the estimated costs presented here. These costs must be incurred if valuable groundwater resources and the public health are to be protected when new landfills are developed. Whether incurred by state or local government, the public will ultimately pay these costs. For purposes of planning analysis, therefore, the full DEQE regulations will be assessed here. If state loans, grants, or other subsidies are offered in the future, the cost to communities may be partially offset by such funding.

Cost Components

The components of the capital and annual costs of new landfills are shown in Table 2-11. These costs are based on a 1985 update of a cost estimating model developed by DEQE in 1981. There are several key assumptions which must be made in order to apply a generic cost model such as this. These are outlined below.

Land Costs. The five representative landfills would require between 6.5 and 94 acres of suitable land. The cost of land is an important assumption which must be made. Consultation with realtors familiar with eastern Massachusetts indicated that three major attributes affect land value most: location (proximity to infrastructure), zoning (with industrial land more expensive than residential), and the physical characteristics of the land (developability). In eastern Massachusetts suitable land may range between \$12,000 per acre and \$45,000 per acre. In the cost analysis that follows, a land value of \$25,000 per acre was assumed.

Table 2-11

Estimated Cost Components for New Landfills

	LANDFILL CAPACITY (TONS/DAY)				
	10	25	50	100	250
CAPITAL COSTS					
PRELIMINARY STUDIES	$ 22,113	$ 22,113	$ 22,113	$ 33,453	$ 33,453
LAND (@ 25,000/acre)	162,500	312,500	550,000	1,025,000	2,350,000
SITE PREPARATION	25,515	49,612	87,318	162,729	289,170
LINER CLAY	119,070	228,728	402,570	749,574	1,360,800
SYNTHETIC	320,922	616,896	1,086,374	2,025,324	3,704,778
LEACHATE COLLECTION	61,803	95,029	155,925	255,150	504,290
UTILITY CONNECTION	8,505	15,309	26,082	47,628	107,730
MONITORING WELLS	3,402	3,402	5,103	6,804	13,608
BUILDINGS	45,360	45,360	68,040	90,720	90,720
ROADWAYS	39,690	82,782	147,420	328,680	737,100
FENCING	16,670	23,814	31,525	85,730	129,389
ENGINEERING	52,046	95,936	166,585	324,551	419,807
EQUIPMENT	95,256	158,760	272,160	408,240	621,423
GAS VENTING & MONITORING	47,401	66,906	89,036	122,018	139,935
FINAL COVER	53,956	120,045	230,576	460,537	1,118,655
OPERATION & MAINTENANCE COSTS	12,928	25,175	43,659	68,040	151,956
LEACHATE TREATMENT	455,477	807,952	1,577,235	3,132,051	-
LEACHATE MONITORING	56,700	56,700	85,050	11,340	22,680
EQUIPMENT O&M	188,698	377,622	476,280	594,216	983,178
UTILITIES	22,680	22,680	34,020	45,360	45,360
LABOR	393,232	437,298	764,511	1,128,114	1,600,893
FILL OFF-SITE	109,272	227,639	455,301	910,625	2,086,560
ON-SITE	52,572	114,239	228,501	457,025	1,055,935
MISC O&M	9,072	11,340	17,010	31,752	72,576
DEBT	244,926	396,078	820,279	1,039,595	1,360,460

Landfill liner. Landfill liners required by the new DEQE regulations may be constructed of clay (usually a 24-inch clay base) or synthetic materials such as vinyl. If clay is available locally, its cost is considerably less than a synthetic liner. Since clay should be available in most parts of the region, the costs analysis below assumes a 24-inch clay liner. Table 2-12 shows the percentage increase in costs if a synthetic liner is assumed, which ranges from 12 to 16 percent.

Leachate treatment. The DEQE regulations require a system of leachate collection and treatment. Either an on-site treatment system or off-site treatment at an existing treatment plant may be assumed. An on-site treatment plant is considerably more expensive, adding from 25 percent to 39 percent to total disposal costs compared to treatment at an existing plant. For the following analysis, off-site treatment at an existing plant is assumed; however, Table 2-12 provides a cost adjustment factor which can be applied if on-site treatment is assumed.

Cover material. Daily cover material for landfill building is required for all landfills. This material may be available on-site, or from off-site. This analysis assumes the purchase of fill material. On-site material would reduce disposal costs by 3 to 7 percent, as shown in Table 2-12.

Other assumptions in the analysis below include:

- Landfill operating life of 10 years
- Leachate treatment for 20 years (10 years during operation and 10 years thereafter)
- Interest on debt is 6%

Cost Analysis

The cost components in Table 2-11 were applied, using the assumptions outlined above, to arrive at estimated costs for landfills of 10, 25, 50, 100, and 250 tons per day (TPD). The cost estimates are summarized in Table 2-12 and displayed in Figure 2-7. The analysis shows that disposal

TABLE 2-12

Summary of Estimated New Landfill Costs

(Landfill with Clay Liner, Off-Site Fill, and Off-Site Treatment)

COSTS	10	25	50	100	250
CAPITAL	$ 955,139	1,320,296	$2,254,453	$4,100,814	$7,916,080
O&M (10 YEARS)	$ 784,626	$1,590,532	$2,696,110	$3,829,042	$6,323,663
TOTAL	$1,739,765	$2,910,828	$4,950,563	$7,929,856	$14,239,743
COST/TON	$ 47.66	$ 31.90	$ 27.13	$ 21.73	$ 15.61
COST ADJUSTMENTS (PERCENT					
SYNTHETIC LINER	+12	+13	+14	+16	+16
ON-SITE TREATMENT	+25	+27	+31	+39	-
ON-SITE COVER MATERIAL	-3	-4	-5	-6	-7

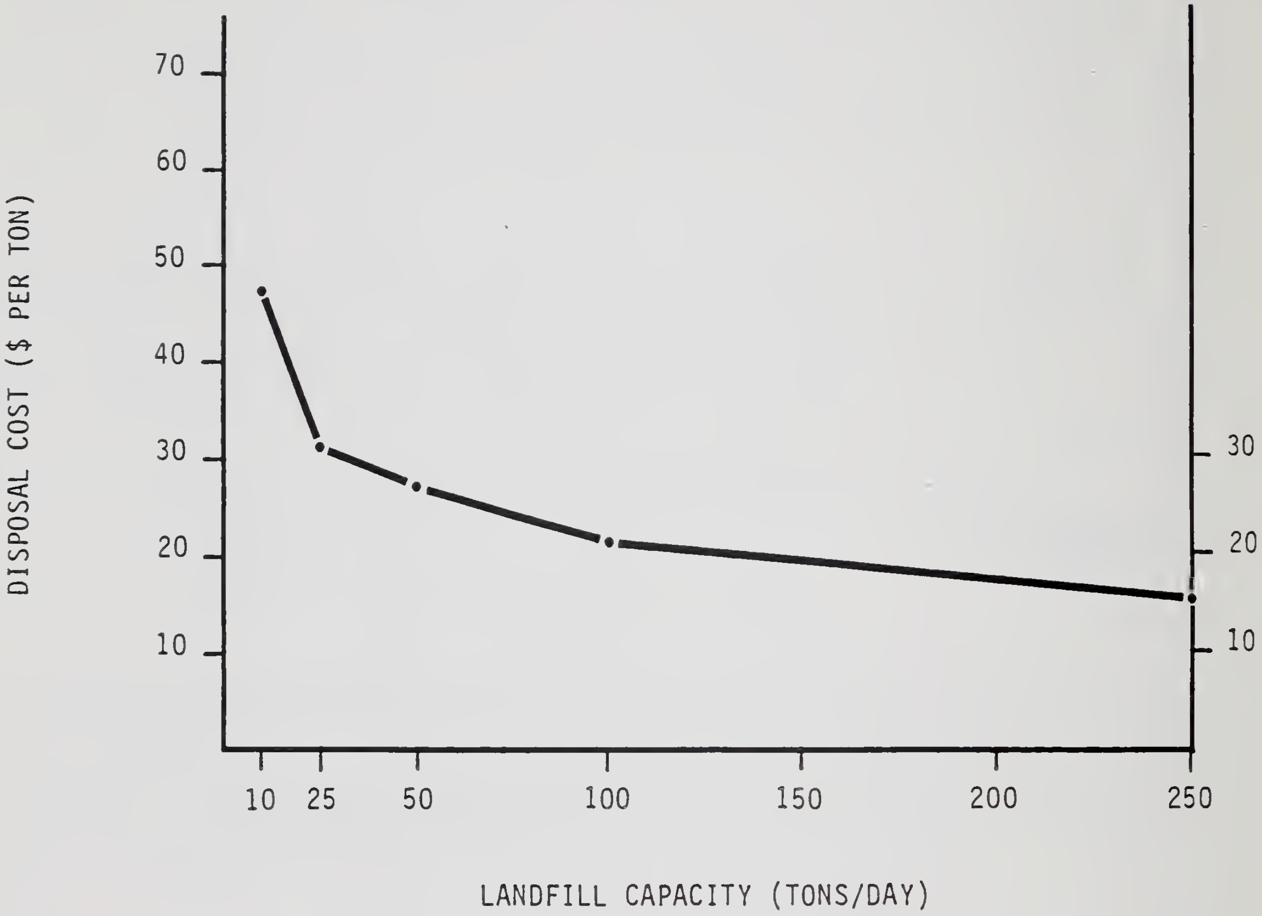


Figure 2-7 ESTIMATED COST OF NEW LANDFILLS

For landfills which meet DEQE groundwater protection requirements, including clay base, off-site treatment at an existing treatment plant, and cover material purchased off-site. Assumes 10 years of operation.

costs vary greatly with the size of the operation, with a 250 TPD landfill costing exactly one-third of the per-ton cost of a 10 TPD facility. As is shown in Figure 2-7, a sharp increase in the cost curve occurs for landfills below 25 TPD. It is important to note that most municipal landfills fall into this size category, indicating that individual town landfills are much more expensive due to unfavorable economies of scale. It should also be noted that the estimated costs for disposal at new small landfills--from $31.90 to $47.66 per ton--contrast sharply with the costs of operating most existing municipal landfills, which averaged $20 per ton in the Southwest subregion in 1984 (see section 2.2 above). These costs are also higher than the current costs of all existing or planned resource recovery plants in eastern Massachusetts, which vary from about $20 to $30 per ton, exclusive of transportation.

As Table 2-12 shows, different assumptions about landfill liners and leachate treatment may add a maximum of 37 to 55 percent to the costs of the various sized landfills, bringing disposal costs up to a range of $33.68 for a 100 TPD landfill, to $65.29 per ton for a 10 TPD landfill. (On-site treatment was not analyzed for 250 TPD landfill.) The use of on-site cover material could reduce disposal costs from 3 to 7 percent, or about $1 per ton.

In summary, the general cost estimates indicate that future landfill costs will significantly exceed existing costs, particularly for municipal landfills which are less than 25 tons per day (generally serving a population of 20,000 or less). These costs indicate that new landfills less than 25 TPD may not be cost-competitive with larger regional landfills or alternatives such as resource recovery. While these cost estimates were derived by a general costing methodology, these trends will be confirmed by the following case study.

Cost Case Study: Norfolk

The town of Norfolk operates a municipal landfill of about 7 TPD capacity. In 1985, the town began the first of a three-phase landfill expansion which is designed to extend the life of the landfill for 15 years, to the year 2000. The expanded landfill must meet the requirements of the new DEQE regulations. The town has detailed records of the costs of the expansion, developed by the town and its consultant. A summary of the expansion costs is shown in Table 2-13.

Table 2-13

Cost of Norfolk Landfill Expansion
(See notes)

Year	Item	Cost	Notes*
1 (Phase 1)	Bentonite Liner	$ 61,000	
Approx - FY 1985	Hypalon Liner for collection ponds	11,124	
	Safety fence for ponds	6,490	
	Collection system materials	5,843.50	
	Sand to mix with bentonite	6,000	1
	Equipment rental	14,411	2
	5 Groundwater wells	5,500	3
	Gas Vents	2,400	3
	Testing	2,500	3
	Engineering design & supervision	20,000	4
	Misc. materials & advertising	5,000	5
	Town labor to install	14,759	6
	Increased operating expense	7,500	7
	Subtotal	$ 162,527.50	
2	Operating expense	$ 16,000	8
	Engineering & testing	5,000	8
	Subtotal	21,000	
3	Same as year 2 with escalation	22,500	
4	Same as year 2 with escalation	24,000	
5	Same as year 2 with escalation	25,500	

6 (phase II)	Bentonite Liner	$ 54,000	3
	Collection system	3,200	3
	Engineering & Testing	8,300	3
	Gas Vents	2,900	3
	Sand to mix with bentonite	6,000	8
	Equipment rental	15,000	8
	Town labor to install	20,000	8
	Misc. material/equipment	5,000	8
	Operating expense	30,000	8
	Subtotal	$ 144,400	
7	Same as year 2 with escalation	32,000	8
8(Phase III)	Same as year 6 with escalation	165,000	8
9	Same as year 2	37,000	8
10	Same as year 2	39,500	8
11	Same as year 2	42,500	8
12	Same as year 8 with escalation	215,000	8
13	Same as year 2 with escalation	48,000	8
14	Same as year 2 with escalation	51,500	8
15	Same as year 2 with escalation	55,500	8
	TOTAL	$1,084,927.50	

*Notes:

1. Estimated value of on-site material consumed to obtain proper consistency of bentonite.
2. Total paid thru December 17, 1984. It if were not for the liner, Town equipment could have prepared the site.
3. Engineer's estimate.
4. Approximately $16,346 expended thru November 1984. The bulk of the cost is the work associated with engineering and supervising installation of the liners, ponds, and collection system.
5. Approximately $3,500 expended thru November 1984.
6. Per Highway Superintendent (direct cost only, to date).
7. Estimate for 6 months of FY 85 includes labor and material to protect and maintain the liner and ponds.
8. Town's estimate.

The cost estimate indicates that the expansion will cost about $1 million, exclusive of interest charges for financing capital costs. This represents capital and operating expenses over the 15-year life of the expanded landfill. These operating costs are in addition to the existing operating costs of the pre-expansion landfill, which were $32,403 in 1985 (see section 2.2.1). Of the $1,084,927 in estimated expansion costs, $400,148 is capital costs and $684,779 represents additional operating expenses.

In order to estimate the impact of the landfill expansion on solid waste disposal costs, the total 15-year capital and operating costs must be divided by the total solid waste tonnage over the period. Table 2-14 shows the results of such an analysis, which indicates that disposal costs will reach $49.68* per ton by the end of the expansion period. This represents a 380 percent increase over current disposal costs. (See notes in Table 2-14 for assumptions used in this cost estimate). Figure 2-8 shows the estimated disposal costs compared to a projected baseline of existing (pre-expansion) costs adjusted for inflation.

This estimate for Norfolk compares favorably with the general cost estimates developed in the previous section. Those estimates indicated that a 10 ton per day landfill would cost $47.66 per ton. Norfolk's 7 ton per day landfill will bring disposal costs to $49.68. Considering that the cost curve predicts higher unit costs with smaller landfills, this case study estimate for Norfolk appears to be consistent with the general costing methodology.

*This figure does not include the cost of interest for financing capital expenses.

Table 2-14

Estimated Future Solid Waste Disposal Costs - Norfolk Town Landfill

	1984	1990	1995	2000
Town operating costs[1]	$32,403	41,354	52,777	67,355
Landfill capital costs[2]	-	26,676	26,676	26,676
Landfill operating costs[3]	-	25,500	39,500	55,000
TOTAL COST	$32,403	$93,530	118,953	$149,031
POPULATION[4]	7492	8500	8800	9000
WASTE GENERATION[5] (TPY)	2500	2833	2933	3000
COST PER TON	$ 12.96	$33.01	$40.55	$49.68

NOTES

1. Based on a 5% annual escalation of the 1985 cost of $32,403.
2. Based on the annualized cost of three expansion phases ($400,148) over 15 years, without interest.
3. Taken from estimates by town of Norfolk.
4. Population for 1984 from U.S. Census estimate. Future years from MAPC projections.
5. Based on data reported by Norfolk for 1984, per capita generation rate of .33 tons/year/person was applied to projected population in future years.

NOTE: Does not include pre-expansion captial costs or DPW administrative costs.

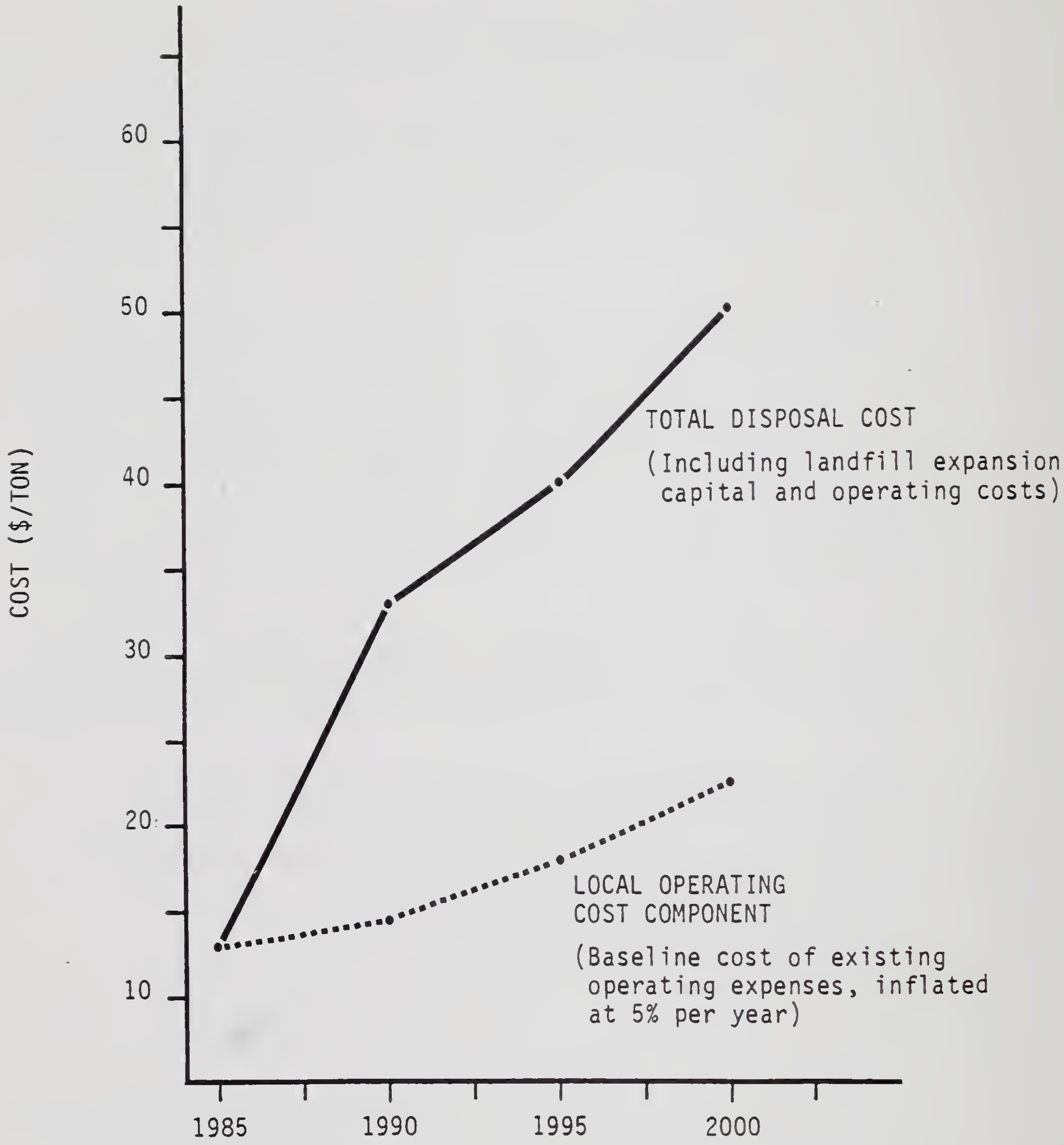


Figure 2-8 ESTIMATED FUTURE COST OF SOLID WASTE DISPOSAL. NORFOLK, MASSACHUSETTS.

2.2.2 Summary

The application of a general cost estimating model as well as a town-specific case study indicate that development and operation of new landfills under DEQE regulations will significantly increase the cost of solid waste disposal, particularly for municipal landfills under 25 tons per day. The estimates indicate that disposal costs of $32 to $47 per ton are likely for landfills in the 10 to 25 ton per day size range. This represents a doubling to tripling of existing municipal landfill costs in the region.

Larger commercial or regional landfills will also increase in cost, although more moderately. Costs for a 100 to 250 TPD facility under the new DEQE regulations are likely to range between $15 to $22 per ton of solid waste disposed.

These imminent large increases in landfill disposal costs will have implications for local and regional solid waste decisions, as most current landfills near their capacity limit within the next three to five years.

2.3 Resource Recovery Facilities

There are two long-term primary disposal solutions currently available to decisionmakers in the Southwest subregion: state-of-the-art landfills and resource recovery facilities. Landfilling, except as a last resort, is not a preferred long-term disposal method. (For the discussion of landfilling, see the preceding subsection.) The remainder of this subsection will be devoted to a discussion of resource recovery facilities.

Local decisionmakers considering resource recovery facilities will need to address issues in six general areas:

1. Cost
2. Process necessary to plan, design, construct, and performance-test a facility
3. Potential air pollutant emissions (e.g., dioxins)
4. Advantages and disadvantages of various technologies
5. Siting a facility and a backup facility
6. Political-institutional-contractual arrangements.

Questions in each of these six areas must be thoroughly investigated in order for the planning and procurement process to result in a successful facility.

2.3.1 The Cost

According to the study, Energy Recovery Status Report prepared by the Bureau of Solid Waste Disposal, costs for currently operating resource recovery facilities vary from \$11.52 to \$40 per ton. Recovery facilities in the advanced design stage also are estimating per-ton costs in this range. It is very important to note, however, that all of the prices in the lower end of this range (less than \$30 per ton) are available only to communities that have already signed long-term contracts. Table 2-15 shows these cost figures.

Table 2-15

Costs for Resource Recovery Facilities in Massachusetts

Project	Location	Status	Capacity	Cost Per Ton
RESCO	Saugus	Operating	1500	19.86-35.00
RFI	Haverhill	Operating	1300	35.00 (Spot) based on length of contract
NESWC	No. Andover	Operating	1500	21-40.00
Vicon	Pittsfield	Operating	240	11.52-15.00
ORFA[1]	Somerville	Adv. Design	330	under 30.
SEMASS	Rochester	Signing contracts	1800	17.20-20.19
RESCO	Millbury	Const. beginning	1500	23.50
HERCO	Holyoke	Const. beginning	685	18-28.00

[1] Obtained from the DEIR for this project.

Questions which communities must address and which will have a direct bearing on the ultimate cost are:

- How will the financial risk be distributed among the participants?
- Who will bear operational risks, such as failure to pass performance tests or destruction of the facility by fire or explosion? Insurance may be available to cover some of these risks.
- If the facility recovers energy, how much will a utility or industry pay for it, compared to the avoided cost of fuel?
- How much revenue will be generated by recovered materials? In some projects, this is the major component of the waste stream. In others, materials represent only a small fraction of revenues.
- What effect will changes in the federal tax laws have on financing the facility and, therefore, on the cost per ton?
- If communities have separate recycling programs, will the removal of materials affect the revenues? Will recycling programs be permitted under the terms of the contract?
- What kind of financing package will result in the lowest cost to communities?

2.3.2 The Facility Procurement Process

Each resource recovery facility now planned or operating in Masschusetts resulted from a different planning/design process. Some facilities progressed from inception to commercial operation in a relatively timely, straightforward manner. Others, like the NESWC project in North Andover, survived years of false starts, major changes in design, fluctuations in community support, a change in the site, and other obstacles before the facility finally began commercial operation (see section 3 of this volume for a more detailed description of the NESWC process). Still other facilities have been proposed and planned, then failed to elicit enough support to go forward.

The procurement process begins when one community, or a group of communities, decides to use a resource facility. Table 2-16 gives an overview of the planning, design, and procurement process. The actual order of events can vary considerably, but this model will serve as a general indicator of how matters typically proceed.

Table 2-16

Procurement Process for a Resource Recovery Facility

Phase	Step
I. Initial Feasibility Screening	1. Investigate all disposal options 2. Determine level of citizen/political support 3. Evaluate markets for energy/materials 4. Estimate waste tonnage available 5. Assess economics, environmental impact, and procurement methods
Political/Public Decision to go forward with resource recovery based on: • Information from screening • Recommendations of study committee	
II. Feasibility Analysis	1. Select project manager/director to oversee rest of process on behalf of communities 2. Select technical consultant to perform detailed engineering analysis and, if the project continues, to assist communities in all phases of procurement 3. Develop public information program 4. Perform preliminary analysis of environmental requirements and possible sites 5. Perform detailed analysis of: • Waste stream • Technologies • Markets • Existing disposal options • Transportation • Financial, legal, and institutional constraints
Political/Public decision to go forward with procurement based on report from technical consultant.	

III. Procurement Planning	1. Choose most probable technology 2. Obtain site 3. Draft environmental impact report 4. Update information on costs and present to communities 5. Structure risks to resolve any financial, legal or institutional constaints that might halt contract negotiations 6. Otain waste supply letters of intent from communities 7. Obtain letters of intent from markets for recovered energy and/or materials 8. Obain backup landfill commitment

Political/Public decision to go forward with facility procurement based on choice of technology, site availability, current cost information, resolution of contractual issues, and letters of intent to commit waste stream and provide markets.

IV. Facility Procurement	1. Establish administrative framework--committee and staff for contract term 2. Produce RFP 3. Evaluate proposals 4. Sign contract with chosen provider 5. Secure preconstruction permits 6. Secure waste supply contracts with communities (and haulers) 7. Secure energy and/or materials contracts 8. Prepare final environmental impact report 9. Secure final design 10. Secure construction contractor(s) 11. Obtain financing
V. Facility Construction	1. Site work 2. Contruction 3. Shakedown 4. Performance Testing
VI. Facility Operation	1. Facility begins commercial operation

This table was adapted from the *Resource Recovery Management Model: Overview* (SW-768) published by the U.S. Environmental Protection Agency, 1980.

As can be seen from Table 2-16, the facility procurement process is lengthy and complex. The (optimistic) minimum length of time required is five years, while one project has taken over fifteen years.

Setbacks in the process can occur at any point and may be beyond the control of communities or vendors. Examples of setbacks encountered by Massachusetts resource recovery facilities include:

- Host community reneging on agreement to accommodate the facility.
- Changes in required pollution control equipment occurring after the initial cost estimates had been prepared and contracts signed with communities based on those estimates.
- More than one disposal project in a region competing for the same waste stream.
- Unfavorable tax rulings, opinions, or changes in law adversely affecting the financing package and, of course, the cost to communities.
- Difficulty obtaining a backup and residue disposal landfill.

Avoiding these setbacks is not always possible, but good planning, organization, and free flow of information helps. Communities must have complete access to information and knowledgable assistance to present this information to the public. Local citizens and officials must always feel that their welfare--physical and financial--is best served by all those promoting the project.

2.3.3 Potential Air Emissions

In the last few years, concern has arisen over possible air pollution from operating and proposed resource recovery facilities. These facilities are or will be all equipped to reduce particulates and other regulated pollutants to an acceptable level. However, there is concern over:

- Requirements for additional pollution control equipment after preliminary design and cost estimates have been prepared, such as the addition of acid-gas scrubbers.

- Possible emissions of nonregulated pollutants, such as dioxins.

Changes in Pollution Control Requirements

Recently several Massachusetts resource recovery projects have had to add pollution control devices to their proposed facilities. These projects were already in advanced planning or design stages and found their designs, construction schedules, and cost estimates altered because of the new requirements.

An example is the SEMASS project to be built in Rochester, Massachusetts and designed to serve more than 30 southeastern Massachusetts communities. Most of these communities had already signed contracts with project proponents based on cost estimates of approximately $12. per ton. When the Department of Environmental Quality Engineering (DEQE) required the addition of acid-gas scrubbers, the cost increased to approximately $18. per ton. Such a significant change required project proponents to invalidate existing contracts and obtain reauthorization from each community. This meant that each town's town meeting had to reauthorize that town to enter into a contract with SEMASS at the higher price and each city's board of aldermen or city council had to do the same.

Communities have expressed another concern: the possibility that changes in law or regulations will require retrofitting pollution control equipment to an already operating facility. While operating facilities are frequently "grandfathered" under new legislation, occasionally they are not. If an operating facility did have to meet new regulations, several issues would have to be addressed:

1. Could changes be made in operation of the facility that would enable it to meet the new requirements?
2. Will new equipment be required?
3. Is new equipment available, or will it have to be specially designed for the facility?
4. How much will a retrofit cost?
5. Who will pay for new equipment?

The communities need to address these issues when they negotiate their contract with the vendor who will design, construct, and operate the facility. Contracts between the vendor and the communities usually specify which party will bear what risks and what will be covered by insurance.

Dioxin

The possible presence of dioxins in the air emissions from resource recovery facilities is of concern to all those involved in solid waste disposal. Local residents living near a facility are concerned about health problems; residents whose waste is disposed at the facility are concerned about whether the facility will remain in operation; and local officials are concerned about both the health effects and plant closure issues.

The American Council on Science and Health, a national consumer education association, explains that there are some 75 compounds in the group known as dioxins. Very small amounts of dioxin are formed during the production of certain chemicals, which are then used to make pesticides and herbicides. Dioxin may also be a product of combustion where chlorine is involved, such as incinerators, coal-burning power plants, and diesel engines.

The Council also explains that, when released into a environment, dioxin ends up on the soil. It has a very low solubility in water, so it will eventually settle to the bottom of a lake or stream. Because dioxin binds tightly to soil, it is very unlikely to migrate through the soil and contaminate groundwater. Once in the soil, dioxin begins to break down; its half-life is three years (i.e., one-half of the dioxin will have broken down at the end of three years). If, however, the dioxin is far enough down into the soil that the sun's ultraviolet rays do not reach it, then the half-life may be as long as ten years. At the bottom of a body of water, dioxin undergoes microbiological degradation. The half-life under water is also about three years.

At this time, there is no clear evidence that modern resource recovery facilities produce dioxin at all, or, if they do, in what quantities and whether production can be either eliminated or controlled.

To benefit society in general, further study of dioxin production and possible health effects is necessary before deciding whether resource recovery facilities are safe and reliable.

In the meantime, however, communities face a continuing solid waste disposal crisis. The environmental threat of inadequate landfill disposal--or _no_ disposal facility available at all--is a more immediate hazard. Communities cannot continue to do nothing about ensuring the availability of a long-term regional disposal method; communities cannot wait for study results to become available.

Instead, communities need to spend the time before a study is completed organizing themselves in support of a regional disposal facility, learning about all the available options, deciding how the project will be operated (by whom) and financed, and informing the public about the regional effort. In other words, the alternative of _not_ pursuing a regional resource recovery facility--at least through the planning stages--is much worse from every point of view: cost, environmental impacts, and solving the problem before time runs out.

2.3.4 Technologies: Advantages and Disadvantages

Volume I of this study includes a detailed description of the three resource recovery technologies in use or planned in the Commonwealth: mass burn, refuse-derived fuel, and ORFA. Decisionmakers will want to consider the following advantages and disadvantages when choosing a technology:

Mass Burn: Advantages

- Waste is burned in as-received condition; little or no preprocessing is required.

- More facilities are in operation (in the U.S.).
- No product has to be transported (by conveyor or truck) to a boiler to produce energy.
- Less dust and litter are likely to escape facility building.

Mass Burn: Disadvantages

- Less opportunity for frontend recycling at the facility-can only use "backend" recovery.
- Facility may produce dioxins.

Refuse-Derived Fuel: Advantages

- More opportunity for frontend recycling, including bulky wastes, and for potential revenue generation.
- Fuel can be transported to another site to be burned, if necessary.
- Fuel may be burned with another fuel (e.g., coal or oil) or burned by itself (in a dedicated boiler).
- Fuel may be produced in different forms (e.g., fluff, pellets).

Refuse-Derived Fuel: Disadvantages

- Waste must be processed before fuel can be used.
- Acceptable waste at RDF facilities is usually more restricted according to size.
- More steps involved in process between tipping of trash at facility and production of energy-more opportunity for breakdowns.
- Facility (where RDF is burned) may produce dioxins.
- Poorly stored loose fuel can litter the facility site.
- Frontend processing means that technology is more energy consumptive.

ORFA: Advantages

- Nonburning technology, assuming that the ORFA Fiber is not used to produce fuel pellets.
- Can be designed and operated in smaller units than other technologies and still be economically feasible.

ORFA: Disadvantages

- A new technology with an unproven track record in the U.S.
- Endproduct markets are uncertain because the products are unusual.
- Project will not be financially feasible unless endproducts can be made to specifications on a reliable basis.
- Requires a more energy-intensive processing system to produce endproducts.

2.3.5 Siting a Facility

It must be emphasized in the strongest possible terms that selecting a site for a regional disposal plant is one of the most difficult aspects of planning such a facility. Many communities perceive all disposal facilities as noxious, regardless of whether there are odors, blowing litter, pests, traffic, and other less desirable qualities associated with a particular facility. In order to counteract the negative perceptions and actually obtain a site, two activities are necessary: a public information program and an open siting effort.

A public information program will let all residents of potential host communities know what is being planned and what is needed. The residents will be given information on the type of facility, the impacts of it, the siting criteria to be used, and incentives available to a host community. An information program will also need to address questions on air emissions. In addition, all facets of the siting process must be open to scrutiny by the public.

Incentives which may be offered to a host community include: free disposal or a per-ton fee in lieu of taxes on all out-of-town waste. Other advantages may include control over the appearance of and access routes to the facility, a host community veto over certain changes in the facility or its operation (written into the contract), and having the shortest distance to transport waste of all users of the facility. Also, the sooner a site can be identified and site-specific work (e.g., the EIR and facility engineering design) begun, the sooner the facility will be available for disposal.

The criteria used to evaluate sites will restrict the number of possible sites. These criteria include:

- Parcel size - there must be enough room for the facility, employee/visitor parking, access roads, and, possibly, a landscaped buffer zone around all or part of the site perimeter.
- Industrially zoned - this requirement eliminates the uncertainty of a rezoning effort and ensures residents that the facility will not be located in a residential area.
- Near major highway(s) - to ensure that vehicles hauling waste will have to travel over local roads as little as possible.
- Near a source of power - for both facility operation and possible energy sale.
- Near a source of water - necessary for some technologies.
- Centrally located within the region it is intended to serve.
- An environmental review is favorable.
- Host community has the power to set up an Industrial Development Finance Authority, if that means of financing the facility is used.
- Community acceptance - as demonstrated by a vote of town meeting.

An appropriate balance of these criteria will ensure a financially viable facility, located in a receptive community. The actual impacts on a host community will vary, depending on: the size of the facility, the size of the site, the access road leading to the site, the design and layout of the facility, and the number of communities that haul waste directly to the plant compared to the number using transfer stations. Other communities will have an interest in the choice of facility site because it will affect hauling methods and costs.

It should also be noted that siting a required backup landfill could prove to be an almost insurmountable obstacle, and that incentives beyond those discussed could, in theory, be necessary.

2.3.6 Contractual Arrangements

There are several issues which will be covered by a contract between communities and the vendor for a facility. The communities, with assistance from MAPC and various technical consultants (e.g., legal and financial), need to determine:

- If there is enough tonnage to support an economically feasible disposal facility.
- If project economics would improve with the addition of more waste from communities just outside the region.
- If additional communities ask to use the facility after planning has begun, under what terms will they join the ongoing planning process.
- Who will bear the risks of failure to operate properly, destruction of the facility by an "act of God," and so forth.
- Who will own the facility and the site.
- Who will operate the facility.
- What mechanism will be used to keep the communities involved throughout the useful life of the facility--in case of changes in legislation affecting operation of the facility or other unforeseen circumstances.
- How the facility will be financed--the risks distributed reasonably and equitably among the towns, as well as between the towns and the vendor.

Additional issues are:

- Obtaining a backup landfill - what are the communities willing to offer to persuade one of their number to host the backup/residue landfill.
- How will the facility siting process be handled.
- How will technical consultants be chosen and what role will they play.
- When decisions are made by the communities, will they use a system of weighted votes or one-community, one-vote format.

2.4 Summary and Comparison of Disposal Options

Communities in the Southwest subregion will choose between four disposal methods:

1. A new or expanded municipal landfill
2. A contract with a commercial landfill
3. A long-term contract with a regional resource recovery facility
4. A contract with a private hauler to transport the waste out of town to a disposal facility chosen by the hauler.

Of these four choices, regional resource recovery facilities represent the best opportunity for most communities; resource recovery is a proven, long-term disposal solution which is economically feasible when developed on a regional basis. Table 2-17 summarizes the four methods.

Only one community in this subregion--Norfolk--can expand its municipal landfill sufficiently to consider it a long-term disposal method. However, the costs of this disposal method will exceed those for resource recovery facilities and the environmental consequences of continued landfilling are uncertain at best. Further, communities that choose to handle disposal on an individual town basis will also bear all the risks of failure or sudden nonavailability of the disposal method.

Table 2-17

Comparison of Disposal Options

Method	Contract Length	Availability		Price Stability	Per-ton Cost
		Now	Future		
Municipal Landfills	Until space is exhausted 1 to 10 years	Yes in 8 towns No in 10	All but one will close by 1995 - not a long-term disposal method	Costs rising due to pollution control systems required. Uncertainty over who will pay for add'l equipment.	1984: $13+ 1990: $33+ 1995: $40+ 2000: $50+
Commercial Landfills	1 to 5 years	Yes, but none within subregion.	Some will probably remain open well into the 1990s. However, availability may be limited by owners to conserve capacity or by price necessary to cover costs of pollution control measures.	Also rising. Costs will be passed on to consumer towns.	10 tpd: $48 50 tpd: $27 100 tpd: $22 250 tpd: $16
Resource Recovery Facilities	15 to 27 years (counting from beginning of commercial operation)	None in subregion. None really close enough to serve.	One could be planned to serve needs of entire subregion, well into next century. Once planning effort begins, it will be at least 5 years before a facility is available. Cannot be done by individual community.	Usually indexed. Once first year's price is determined, other years are predictable. Higher for short-term contracts or "spot" tipping.	1985: $11.50 to $40. Rates to communities with long-term contracts are $15 to $33.
Private Hauler	1 to 3 years. Increasingly on an annual renewal basis.	Several haulers.	Those without their own disposal site are more likely to go out of business due to unpredictable cost increases. Not a long-term disposal method. Communities could find themselves without collection and disposal very suddenly. Communities may only receive one bid.	Subject to dramatic annual increases. Communities may have no choice among haulers. Unexpected mid-contract increases due to changes in disposal facility.	Currently $30 to 65.

The other seven communities in the Southwest that are now landfilling will exhaust their capacity before or very soon after a resource recovery facility could be available. For these towns, landfilling needs to be viewed as an interim disposal method to hold them over until a long-term facility is available.

Most important, these communities must recognize that the planning and procurement process for a regional resource recovery facility takes years; they cannot wait to begin planning if they want a facility to be available by the time their landfills are full.

Communities now contracting with commercial landfills for out-of-town disposal know the expense and uncertainty of this disposal method. Commercial landfill space is, after all, in increasingly short supply. Contracts are seldom written for more than a year or two and costs have escalated dramatically from one year to the next. This short-term pattern with unpredicatable cost increases can be expected to continue.

An additional factor to consider with out-of-town disposal is the increasing cost of transportation. Each time a community contracts with a commercial landfill at greater distance from the community the hauling costs will increase.

It is extremely unlikely that new commercial landfills will be sited in this region. No individual or community wants to have a landfill nearby or within town boundaries, making siting nearly impossible, particularly with more stringent environmental standards that did not exist years ago. Therefore, communities should not plan on new landfills to open--as they have in the past--just as other landfills were closing down.

A few communities have chosen to enter into a contract with a private hauler for both collection and disposal. The contract does not specify a particular disposal facility. In these cases, communities may be at the mercy of their haulers; if the hauler does not own or control his own disposal facility he may find himself shut out of a facility. If no replacement facility is available at comparable cost to the hauler, he may not be able to fulfill the terms of his contract. The community may be faced with a cost increase at contract renewal time, in mid-contract (and, probably, mid-budget year), or, in the worst case, may have to find a new hauler on an emergency basis.

For communities on tight budgets, this is too unpredictable a situation. Communities cannot rely on someone to make the trash disappear; officials need to choose a hauler for collection and transport of the waste and the officials need to choose a disposal facility based on what their community needs. The best way to be certain those needs are met is to help plan the facility. The most encouraging aspect of participating in the planning for a resource recovery facility is that officials don't have to come back one, three, or five years later and react to a crisis all over again. It will be a long-term disposal method.

In summary, here are several reasons why a long-term regional resource recovery facility is the most appropriate disposal method now available to communities in the Southwest subregion:

- Landfills, especially municipal ones, are rapidly reaching capacity.
- These landfills, and some of the commercial ones, might be major sources of water pollution.
- The costs of designing, constructing, and operating a state-of-the-art new or expanded landfill are similar to the cost of long-term contracts at resource recovery facilities on a per-ton basis.
- The economies of scale inherent in a regional resource recovery facility will keep the costs in line over the life of the contract, which is usually not the case over time with landfilling.
- With a long-term contract at a resource recovery facility, a community will not have to face an annual (or every few years) hunt for a new disposal facility.

- Resource recovery facilities turn waste into useful products: steam, electricity, solid fuel, and/or recycled materials.
- Landfills, except for a backup one, can be closed, capped, and put to a more desirable use.
- Resource recovery is compatible with existing or planned recycling or source reduction programs.
- The environmental uncertainties of resource recovery are of concern and do require additional research. The environmental consequences of landfills are more immediately and emphatically disturbing, however, particularly in cases where the water table has been polluted steadily for many years. It can be said without hesitation that landfills are more environmentally threatening.

3. Project Implementation and Financing

3.1 A General Perspective

Implementing and financing any kind of major solid waste disposal facility is an undertaking of extreme complexity. It requires not only the full fiscal and legal commitment of participating communities, but the availability of a battery of experts. Among these professionals are a design engineering team, general counsel, bond counsel, vendors in the disposal facilities business, corporate and underwriting bankers, the public bond-issuing entity, a general financial advisor, and usually a technical/coordinating staff. This team can be brought together in a variety of different ways, but generally all or most of the aforementioned parties are involved.

No two projects result from an identical planning and construction process; each is a unique case which evolves from such circumstances as: the interaction of the (collective) municipalities; the actions and express interest of private facilities providers; various fiscal, environmental, and siting constraints; engineering decisions; the financial security and capacity of the towns; the reliability of the anticipated waste stream; the revenues to be generated (in the case of resource recovery); and sometimes a host of other factors. In order to establish, explain, and secure all of the preceding needs into a feasible package, an extensive series of legal and financial documents emerges from the facility planning process. Moreover, all of these documents (and many others) must be in place before financing is actually implemented or securities marketed.

As mentioned, solid waste facility implementation is a topic of the most extreme complexity, and great volumes could be written just describing the topic and presenting case studies. The objective of this section is to present a brief description and outline of the most salient facts, in order to provide municipal officials with a general idea of what to expect when facing these decisions. It is all too easy for anyone to be initially bewildered, if they are brand new to the process of planning and implementing a solid waste facility.

This section continues with a discussion of issues affecting implementation, includes an example of the implementation process (the NESWC facility), focuses on implementation of a project in the Southwest subregion, and concludes with information on financing a disposal facility.

3.2 Issues Affecting Implementation

A group of communities considering a long-term regional resource recovery facility will first want to determine if they generate enough solid waste to support an economically feasible facility. Once communities have determined that they can support a facility, a host of fundamental questions must be asked and answered, including:

- Can a lead municipality and/or a loose consortium of towns, plan, negotiate, finance and implement a project of this complexity?

- If not, can they contract with consultants and other technical experts to obtain help, with a committee made up of representatives from the communities still taking the lead?

- Should a Regional Refuse Disposal District be formed under the statutes, in order to plan, negotiate, finance, implement, and operate the facility?

- Alternatively, can the entire enterprise, from planning to operations, be "privatized" to a qualified resource recovery vendor?

- What combination of equity capital (debt/equity), bonds, and revenue or industrial revenue bonds will be necessary to adequately and securely finance the project?

- What about the crucial need to secure the necessary waste stream volume via binding legal agreement, backed up by financial sanctions? This issue is the ultimate key to project success.

- The entire issue of energy recovery and sales (as well as certain other revenue sources in a resource recovery facility) must be thoroughly addressed in advance; what are the market prospects for the proposed energy, and what price structure can be maintained for what time period? How will the risks from energy sales be equitably distributed among member communities?

- How will all of the other legal and financial risks be distributed among the member communities, involving such contingencies as natural disaster, drastic shutdowns, changes in law, changes in financial markets, and other circumstances.

- The need for backup landfill capacity must be part of the plan; which site(s) within and without the subregion have the physical capacity, environmentally sound operation, and the official willingness to provide this function, in order to accommodate residual ash, nonburnables and oversize items, and, possibly, sludge?

- The everpresent and perplexing issue of site selection is always of concern; what special incentives and bonuses can be worked out to induce facility site hosting?

These and additional related issues must be confronted by any group of communities considering a solid waste disposal project. When the facility planning process commences, it must also be remembered that whatever structure is set up for planning and carrying out the entire effort, certain statutory powers and abilities must exist within that administrative framework. Among them are: the right and capacity to sell bonds and encumber long-range debts; the legal and technical capacity to negotiate detailed contractual conditions; the ability to be a signed party to any contracts; the expertise and authority to control the volume and nature of the waste stream flow; the authority to handle and disburse funds for day-to-day operations; the capacity to hire vendors; and the mandate to choose a site.

Massachusetts presents special challenges in terms of organizing a project. In much of the rest of the nation, the county (punctuated by independent local units such as cities or midwestern townships) is the basic regional unit of government. Dealing with a single and fully empowered public entity avoids the whole process of trying to get multiple, independent political units to cooperate. This relative ease of organization is normally the case with counties, provided, of course, that the county and solid waste region are one in the same.

Massachusetts is a more difficult situation, because of the historic practice of municipal home rule. It takes extra effort to form loose consortiums, and still more to establish a formal mechanism. All of this usually means that the process takes longer, but the existence of numerous, successful plants in New England attests to the fact that it certainly can be done.

It should be noted that the predominant model for waste projects in this area has been the one where interested communities begin by forming a loosely structured committee or voluntary association. As soon as possible, the necessary engineering and financial expertise is obtained and the long, detailed technical studies are conducted. A concurrent site search might take place. Meanwhile, a resource recovery company might already be integrated into the arrangement, or an entirely open solicitation of providers might be conducted, as is most often the case.

The committee might gradually solidify its operating status and, in larger projects, will probably hire staff to carry out the multitude of necessary activities. More consultants might well be added when the vendor/provider is chosen.

There have been instances, some of which eventually became successful projects, in which the private resource recovery vendor actually provided the initial thrust for a regional resource recovery project. In such cases, the firm might perceive a potentially adequate waste market in a geographic area where few or no disposal solutions seem to be evolving. The company might gather pertinent data, and then actually conduct research into one or more potential sites. They might start to publicize both the data and the sites, and then start to meet informally with public officials from various towns. This can be enough to "start the ball rolling."

In an impending solid waste crisis, however, this wait-and-see approach could be inadequate. It is incumbent upon communities to take a less passive stance and actively encourage remedial measures, rather than waiting for actions which may or may not occur.

In actual practice, the private resource recovery provider is almost always the operator and maintainer of the plant; this is, after all, their business, and there is no reason to feel that a public authority could perform more successfully. In nearly every one of these cases, the private provider is also the full owner of the plant and sometimes of the site. Occasionally, there is a project where, for example, a landfill area and adjacent land might be donated as the site for the plant, and some public authority retains ownership of the land, while the company owns the structures and adjunct facilities.

It is conceivable that a public authority could own an entire facility and then either enter into contract with a provider to operate and maintain it, or lease it back to the private firm. There do not appear to be clear advantages to employing these approaches, while a number of clear disadvantages are apparent, such as loss of certain tax write-offs and depreciation.

The preceding description is a generic, highly approximated one. Again, it should be emphasized that no two projects are ever implemented in precisely the same way. This kind of undertaking should be viewed as what it really is: a $100 to $200 million (or more) business venture that is further complicated by the need for public/private partnerships, public and private financing, and great legal complexity. Ventures of this magnitude can never follow a single, predictable path.

3.3 An Example: Implementation of the NESWC Project

The implementation issues presented in the preceding section represent a generic overview of resource recovery project implementation in Massachusetts. Table 2-18 gives a realistic illustration of the complex planning, procurement, construction and commencement of operations process for the NESWC facility now operating in North Andover. This facility took over 15 years from initial efforts by a few communities to commencement of commercial operations.

In brief, the communities, vendor, consultants, and state agencies involved confronted and solved problems concerning:

- A constantly changing group of communities supporting the project
- A change in the site--and host community
- Preparation of a second EIR and set of detailed facility designs due to site change
- Other disposal projects competing for the same waste stream

- Changes in level of state backing for concept of resource recovery
- Changes in financing method due to unfavorable tax rulings
- Difficulty obtaining backup landfill
- Major increase in proposed per-ton cost over the time period involved

Table 2-18

A Summary of the History of the NESWC Project

1968-1972	Informal voluntary association formed and discussions held with consultants later hired.
1973	Regional Landfill Plan recommended by consultant, rejected by multicommunity study group. Legislative Initiatives; Bureau of Solid Waste powers established. State approached for technical assistance.
1974	Site selected (Haverhill). Request for Qualifications/Request for Proposals issued to industry.
1975	Competitively negotiated procurement; six qualified proposers.
1976	Host community rejects project by local referendum, negotiations with contractor suspended.
1977	New site selected (North Andover).
1978	(Second) Environmental Impact Report approved.
1979	Service Agreement and initial financing structure: ● Anticipated third-party equity ownership ● Assumed prenegotiated Electric Power Purchase Agreement.
1980	Electric Power Purchase Agreement renegotiated. Financing and Ownership Changes: ● UOP ownership required ● Project economics restructured
1981	Construction Agreement negotiated. Service Agreement available, April. "Marketing" to Sign up contract communities and private haulers.

1982	Agreement (Service and Construction) amendments and other changes: • Additional contractor risk assumption (pay off bonds at less than 100 percent performance) • Service fee reduction obligation by contractor (for shortfall in tonnage) • Indemnification to reflect the 1982 Tax Law (reduced depreciation benefits) • Unfavorable IRS ruling regarding tax status of initial vendor profits. • Contractor to purchase additional bonds to reduce early year tipping fees • Indemnification by contractor of tonnage commitments for certain communities.
1983	Bond Closing, April. Construction commencement, May.
1983-1985	Detailed Design, Construction, Start-up, and Testing Full commercial operation began in September 1985, although the plant had been operating at a large proportion of capacity for nearly a year before that, in a performance testing mode.

This table adapted and modified from: "The Development and Financing of the Northeastern Massachusetts (NESWC) Resource Recovery Project: A Tale of Twenty-Two Cities and Towns" by Harold J. Yaffe (Roy F. Weston, Inc., Burlington, Massachusetts) and Jonathan Wooten (Smith Barney Harris Upham & Co., Inc., New York, New York).

Several important observations emerge from a study of the NESWC history. First, it should be possible to plan a facility in less time, given a stable group of participating communities. It is essential to collect a large enough group of communities to support the faciity together at the outset, so they can be involved in the planning of the facility. Each community must be willing to participate and feel that it has a stake in the outcome.

Another observation is that a willing host community is essential. Not only must community officials support the facility, but residents should be given the opportunity to approve it, also. This approval may be shown by a vote of town meeting or a local referendum. Problems are likely to arise if residents find themselves hosting a facility they did not ask for and may not understand.

Generally the longer it takes to plan, design, and construct a facility the more time there is for: changes in legal and regulatory requirements, increases in estimated per-ton costs, changes in both state and local administrations, and decreases in available interim disposal facilities.

3.4 A Southwest Project: Implementation

Until a true regional solid waste planning process is well underway, with a standing committee or district and the necessary feasibility studies for engineering, financing, and administration available, a single, definitive course of action for local officials cannot and should not be set. To attempt to do so at this purely conceptual stage would be little more than guesswork. It is reasonable, however, to make certain observations in regard to overall project feasibility in the Southwest area and potential further steps to be considered. These thoughts are summarized in this section.

Let us speculate that 14 to 16 communities within the designated Southwest subregion begin to meet informally and to express serious interest in a regional resource recovery facility. The first step might be to assess existing disposal practices and attempt to quantify in greater detail the amount of solid waste produced in the area. It might well be that the committed waste stream is simply not sufficient for the operation of an efficient, full-scale plant, so other communities, most likely certain ones to the north and west, will have to be contacted to assess their interest.

The initial issue to consider is that of is waste volume. The 18-town subregion designated for this study currently generates only about 140,000 tons per year or 380 tons per day (TPD). Plants serving this relatively low capacity do exist. For example, the Vicon mass-burn facilities in Pittsfield and Springfield are in the 250 to 500 TPD range. There are two general points of caution, however, in regard to building the smallest possible facility.

The first point is that the great majority of communities in the Southwest are small towns, by the standards of Metropolitan Boston. Carrying the fiscal burden of even a relatively small plant could be prohibitive for 14 to 16 towns in the subregion.

The second point is that certain economies of scale exist with larger plants. For example, almost any regional plant, even a relatively small one, usually has at least two processing "lines" or systems, with each backing up the other. Extra capital investment to ensure this backup capability would be proportionally more burdensome, with smaller amounts of waste from fewer communities; this tends to inhibit economies of scale.

If a larger scale facility is pursued, then it will be necessary to gain the interest of additional communities. Many of the towns to the north are facing a major disposal problem, although a subregional solid waste planning effort has begun in MetroWest. There are also some unserved communities in the adjacent areas of central Massachusetts that might be interested in participation, as well as several South Shore communities located to the east of the Southwest subregion. The site ultimately chosen for the facility will clearly have a major bearing on what additional communities join the project.

Once a voluntary association has been established, then the specific nature of the organization must be defined. It is perfectly feasible for Southwest decisionmakers to set up a standing committee (or formal advisory board), in the manner of NESWC and the Southeastern Massachusetts (SEMASS) Committee, with hiring of consultants and solicitation of resource recovery providers. This model must be viewed as a proven one in Massachusetts.

On the other hand, if the current comprehensive state solid waste legislation does pass, it contains a major inducement to establishing a formal Regional Refuse Disposal District. Perhaps the major reason why these districts have rarely been employed is that there are limitations on fiscal capacity and autonomy. Now, however, the legislation would permit a new kind of Refuse Disposal District. These new bodies would have the authority to market revenue bonds, in which the debt retirement is linked to eventual project revenue. For this reason, as well as for the sharper administrative profile offered by a full district authority, the district approach should be considered by Southwest officials. The advantages of this strategy are considerable, but it should be kept in mind that the district will become a permanent entity, even if it is minimally staffed once the plant is on-line. The district can also function as a broader solid waste management agency, dealing with topics such as regional landfills or recycling.

In any event, a feasible method of getting started on a long-term solid waste project is outlined in the paragraphs to follow. The intent is to obtain initial seed money and limited technical expertise that are sufficient to allow the effort to begin in earnest. It is at this stage that the Metropolitan Area Planning Council can be of considerable assistance, having targeted the Southwest subregion and being committed to providing follow-up to this study.

All of the towns in the Southwest should be encouraged to form a voluntary association to begin the initial discussions. MAPC can help in coordination and in provision of basic information. The group should then consider the submission of a technical assistance application to the State Bureau of Solid Waste Disposal, which is the agency moving in the near future from the Department of Environmental Management to the Department of Environmental Quality Engineering.

Under the Bureau's technical assistance program, clusters of towns obtain the services of a consulting team (headed by an engineering/design firm) that is under contract to BSWD. The consulting team serves the entire state, so their services must, of necessity, be limited. Nevertheless, important technical work can come of this grant, if the funds are obtained.

In order to submit a cohesive proposal considerable effort must be expended, first in the form of the group discussion and then in the preparation of the grant application. Here again, the MAPC can be of assistance in the process.

Several towns in the Southwest subregion have been pursuing a joint BSWD technical assistance application for some time. The initial submission was felt by BSWD to be vaguely defined and oriented to a somewhat shorter-term view. There is nothing wrong with a small consortium of this type being formed to pursue very short-term measures in a crisis situation. For example, this application was made for assistance to explore the potential for increased recycling as part of a solid waste management program.

The short-term activities just described are clearly necessary and valid. Impending crises must always be addressed. The point to remember, however, is that long-term solutions must still be found. When the Southwest towns decide to pursue a long-term proposition, it should be pursued with more than three communities involved in the process.

Once communities with sufficient waste are organized and ready to pursue a long-term regional disposal facility, there are several tasks that they need to undertake:

- Research all available disposal options, to be certain that none are overlooked. Then, both officials and residents of the communities will have confidence that all possible options were considered in the process of choosing the one that will best serve the region's needs.

- Begin a public information and participation program to keep everyone informed on the project's progress. The advantage of a well-designed program is that it encourages two-way communication. This allows project representatives to anticipate the public's need for information.

- Much further into the process, when preliminary feasibility has been established probably with MAPC assistance, hire a technical consulting team to do an in-depth feasibility study, covering project economics, technologies available and/or preliminary engineering, markets for recovered energy/materials, transportation analysis, siting considerations, backup landfill acquisition, legal/regulatory requirements, and financing methods.

When research is completed, and a consultant has prepared the feasibility study, next steps for the communities will include:

- Soliciting a qualified vendor to design, construct, own, and operate the facility.
- Choosing a site, including preparation of the EIR by the consultant.
- Negotiating contracts with vendors, markets for recovered energy/materials, host community, and member communities.
- Signing contracts.
- Financing the facility.
- Completing the final design and engineering.
- Constructing and performance testing the facility.

Other steps may be necessary as planning for the facility continues. The most important thing for communities to do is to get started and keep moving; the passage of time when nothing is done not only means wasted time and lengthens the total time until a facility is available, but also means that some communities may run out of a disposal methods in the interim. Also, the longer the planning process requires, the more opportunity there is for problems to arise, participants to abandon the project, and efforts to stall.

The Metropolitan Area Planning Council is ready to assist communities in planning the project and coordinating all the participants.

3.5 Financing: Methods and Risks

3.5.1 Methods

Any package of financing tools for a large resource recovery facility or similar project can be financed in many different ways. The final plan depends upon the nature of the public/private partnership, the need for special financial aspects within the package, and the fiscal capacity of public members. Experienced financial advisors will be necessary to research the subject, formulate a plan, and to help in putting the entire package together.

Pending federal legislation may have a major impact upon municipal bonds and industrial development bonds. There are proposals to eliminate the tax exempt status of the former, and to curb or even eliminate the latter. If either or both provisions pass, the total revenue and financing picture for any given public utility project could change significantly. Inevitably, the effect would be to increase costs.

In order to convey some idea to municipal officials of the available financing mechanisms, the following brief descriptions are offered:

- Revenue Bonds

Revenue bonds are typically issued by an authorized public entity (municipality or authority), to be lent to the resource recovery provider for meeting project costs. They are substantially, although not fully, tax-exempt, and may be sold without voter authorization, unlike general obligation bonds. They are, however, more complicated and often require that high interest rates be paid. This is due to the fact that the transaction involves more factors and is secured by future conditions that do contain some risks. Usually a single town acts on behalf of the association as the bond issuing authority, with the debt spread among all communities.

- Industrial Revenue (Development) Bonds

These securities in Massachusetts are issued through the Massachusetts Industrial Finance Authority, or via duly authorized local authorities. Because MIFA bonds are not secured by the full faith and credit of the Commonwealth, the borrower must secure a private lender as part of the transaction. The interest is federally tax exempt, however, so that below-market rates can often be obtained. MIFA bonds have provided a substantial portion of financing for three facilities in the State, including the new Millbury Signal/Resco plant.

- Equity and Debt Financing

Private equity financing can provide a portion of the costs of a project and can do so with numerous tax write-offs for the providers (although some IRS modifications are being proposed to this). Since the private providers are bearing the capital investment, the overall debt service is usually less than with the bonding packages. On the other hand, private financing can often have an extremely complex and difficult structure.

- Special Taxable Bond Issues

Due to unforeseen circumstances, such as changes in interest rates, energy markets, tax codes, or many other factors, some projects occasionally have had to add a further component to the financing package, usually in the form of bonds being sold to the provider, in order to raise more money to more fully absorb risks and known deficits. Eventually, the bonds must be paid back out of project revenues, which ultimately translates to tipping fee increases.

- General Obligation Bonds

G.O.s are the simplest, most easily implemented method and are often the lowest in cost since they do not require special provisions and/or debt reserve funds. They are always, however, part of the municipal debt service, which can be a major annual burden, and they require voter approval. Most important, however, they are almost never used to finance major solid waste facilities, because they were never designed to be "piggy-backed" with private equity capital.

3.5.2 Risks

- Construction Risk

There are two overriding kinds of risk in any project. One is during construction, while the other is upon commencement of operations. During construction, the various bond purchasers are normally secured by the full liability of the vendor (private provider) to construct and complete the facility successfully, barring only the most extreme circumstances. Moreover, all changes in the construction project that are absolutely necessary normally must be borne by special private bond sale, up to the full degree necessary to finish the undertaking.

- Operations Risk

Operations is really the critical aspect of a project, in the sense that conditions invariably change over the course of time, sometimes to an emphatic degree. A number of points should be understood in regard to these risks. Basically, the participating communities always have the unconditional obligation to meet their payments, in order to pay the debt service and various other costs. This commitment has usually been applied, even under non-operational conditions, although there is some trend toward shifting more of the risk to the private side. The towns can sometimes seek damages later from the vendor, but their fundamental obligations still stand. The chief exception to this circumstance is when the vendor has assumed a complete "privatization" role from the beginning, in both construction and operations; in such instances, the vendor would assume a greater proportion of the risk.

The other important fact to note is that each of the community commitments under the binding Service Agreement, while technically separate from one another, are constrained by provisions that impose certain default sanctions. If one town defaults, it is a common provision for that community's share to be taken away from the energy revenues that are returned to the other towns in the negotiated tipping fee formula.

- Miscellaneous Factors

In certain resource recovery projects, there are occasionally other factors affecting the total financing picture, such as:

a) As a final impetus to completing the financing package, there have been projects where liens were placed on the facilities, in order to provide additional security; this can complicate the entire financial and debt service package.

b) IRS rulings on the tax status of various public/private partnerships have been a factor in projects around the country; in NESWC, for example, stringent limitations placed on bonding tax exemptions by IRS ruling required extensive refinancing strategies.

c) Failure or refusal to sell additional private capital bonds has constrained numerous projects, in which the vendor and public entity disagree as to the extent of additional private capital that needs to be raised.

3.5.3 Summary of Financing Requirements

The long-term financial stability of a resource recovery plant (or other large scale solid waste management facility) rests on the following critical factors: the obligation of the participating towns to pay their disposal fees; the continuity of plant operation, which in turn depends upon the reliable, uninterrupted flow of the contributing waste stream; and the continued availability of the energy market and the sales revenues generated by it.

To cite just one example, it took the NESWC project over 15 years to reach commercial operation because it took that long to persuade enough communities to commit to full participation. For local officials, understandably concerned about both their responsibilities to the public and the public's perception of their performance, signing a 20-year contract with a new technology was a huge step procedurally, fiscally, legally, and chronologically. A regional resource recovery facility was a long way from the old, standard town dump--a controllable, single-town public works project of the size and scope officials were accustomed to dealing with.

Increasingly, however, the dictum "he who hesitates is lost" can be applied to resource recovery project commitments. The recent exclusion of seven communities from the SEMASS facility happened when the proposed facility reached capacity. This is a dramatic illustration of the decreasing number of alternatives available to communities with little or no remaining in-town disposal facilities; with the number of landfill closings accelerating, there is increasing pressure being put on communities to sign up with an economically feasible, environmentally sound alternative. Communities can no longer expect that a regional facility that comes around looking for tonnage will be back again the next year.

Another issue that needs underscoring here is that of energy sales. Markets and demand for energy change, agreements terminate, and revenues fluctuate. For instance, the RESCO resource recovery facility in Saugus is converting from steam generation, which was produced for sale under a ten-year agreement with the General Electric facility in Lynn, to turbine generation of electricity, which will be sold to New England Power. Communities that originally signed up with RESCO contracted for 20 years, but the energy revenues were based on a ten-year contract. When the steam sale contract expired, RESCO management had to find another energy market. While there can be no financial guarantees regarding energy revenue, communities and consultants negotiating contracts concerning energy revenues must identify the options and evaluate them with extreme care.

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